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21 JANUARY 1987

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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INDIA, PAKISTAN 'MAKING NONSENSE' OF NUCLEAR CONTROL

Hong Kong SOUTH CHINA MORNING POST in English 19 Nov 86 p 20

[Editorial]

TWO of the world's poorest nations are, with a bare minimum of discretion, making a nonsense of global efforts to control the nuclear arms race. If India and Pakistan find it impossible to agree on anything else, they are both adamant that atomic weapons should not be the sole preserve of developed countries. And in their determination, both demonstrate the great powers' ultimate powerlessness to halt mankind's seemingly inevitable progress towards self-annihilation.

Neither country has come close to solving their problems of poverty and domestic instability. India has a population of nearly 750 million people, average life expectancy of 55 and per capita GNP of US$260. Pakistan has a population of 90 million, life expectancy of 50 and per capita GNP of US$390. (By comparison, Hongkong's per capita GNP is more than US$6,000, and people here can expect to live for 76 years.) India is preoccupied with its intractable internal divisions while Pakistan, no haven of domestic peace either, has the added worry of a Soviet army of occupation just across the border in Afghanistan.

Yet both have managed to acquire sufficient expertise and enough technology to join the elite group nations which possess nuclear weapons. Whether either actually has an atomic weapon ready for launching is irrelevant. There is enough evidence that research in both countries has reached the stage where it would take, as one Indian official has said, just "two twists of a screwdriver" to assemble a nuclear bomb many times more powerful than those which were dropped on Hiroshima and Nagasaki. Both impoverished nations have managed to circumvent international agreements designed to prevent the spread of nuclear weapons technology. This calls into question the effectiveness of these controls, and more importantly, whether the will to enforce them really exists.

Efforts to restrict membership of the "official" nuclear club – the United States, Russia, Britain, France and China – depend on a purely artificial distinction between nuclear technology designed for peaceful purposes and that which provides weapons of destruction. India and Pakistan have made mock of this distinction by using "peaceful" nuclear research programs as a front for their weapons development. India even went so far as to describe its first and only nuclear test in the Rajasthan desert in 1974 as a "peaceful" explosion. The Murphy's Law beloved of engineers – if something can go wrong it will – has an equally widely applicable parallel: If a technology can be put to destructive use, it will be. Rocketry is a further example: the same rockets that India has developed to launch satellites could also be used to deliver nuclear warheads.

One of the advantages to developed states of maintaining this illusory distinction between the peaceful and the military applications of nuclear technology is that it enables the thriving export divisions of national nuclear industries to continue their profitable sales drives throughout the developing world. The profits are not always financial, either. There are political spin-offs from the sale of nuclear technology and we in Hongkong only have to look across the border to Daya Bay to see an example.

Even though it has been abundantly clear for some time on which course both India and Pakistan are embarked, there has been little effective action to deter them. Whatever measures have been taken have either been ineffective or have come too late to do anything other than cause minor delays to weapons development programs. The Canadians withdrew from a nuclear power joint venture in India after the 1974 test, but enough of the project had been completed to enable India to continue on its own. France had supplied 95 per cent of the plans for a nuclear fuel reprocessing plant to Pakistan before succumbing to American pressure and withdrawing, the plant would enable the Pakistanis to extract the plutonium necessary to make bombs from spent fuel from nuclear power stations. It is also widely believed that China has been supplying both India and Pakistan with heavy water (a vital ingredient in the transformation of uranium into plutonium) which is not subject to the checks imposed by the International Atomic Energy Agency. The agency enforces restrictions on nuclear technology transfers under the 1968 Non-Proliferation Treaty, which neither China, India nor Pakistan have signed.

The world's attention is most often focused on the nuclear rivalry between the United States and the Soviet Union, as if between them they encompassed the worst fears and best hopes of man's surviving the destructive force of his own inventions. Meanwhile, the seeds of a nuclear holocaust are in fact more likely to flourish in the impoverished Third World. The Pakistanis, for example, have reached the point of testing the trigger mechanism for a nuclear bomb, a pointless exercise, one would have thought, unless they actually had a bomb to trigger. India will not be far behind in carefully leaking a parallel development of its own. These two countries have been at war three times in the last 30 years, and there is little encouragement for the view that those clashes have taught them how to settle their differences peacefully.

Unless the official members of the nuclear club are prepared to act swiftly and decisively to control the spread of all nuclear technology, the odds against a war being fought with nuclear weapons will diminish every year, with no guarantee at all that such a conflict could be contained in the Third World.

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PAPERS CONTINUE TO REPORT REACTION TO DAYA BAY PLANT

Request to Watchdog Committee

Hong Kong SOUTH CHINA MORNING POST in English 7 Nov 86 p 7

[Text]

LOCAL anti-nuclear campaigners yesterday submitted a seven-point proposal to the Legislative Council's Daya Bay ad hoc group asking legislators to scrutinise the nuclear project closely.

The Legco watchdog on Daya Bay created late last month was asked to consult nuclear experts extensively rather than confine itself to fact-finding reports completed several months ago by members.

Spokesman for the Joint Conference for the Shelving of Daya Bay Nuclear Plant, Mr Fung Chi-wood, said the ad hoc group should urge Chinese authorities to restructure its Nuclear Safety Administration (NSA) to ensure impartiality.

At the moment, the NSA is headed by a Chinese official who is also an adviser to the Nuclear Industry Ministry. The ministry is supposed to be monitored by the NSA.

Mr Fung's group also reiterated its earlier demand to China to establish a monitoring committee on the mainland with Hongkong's participation, to scrutinise the construction and safe operation of the Daya Bay station.

The Legco ad hoc group should also continue to press for the release of various documents and reports on the project which have been kept from the public for various reasons.

These papers include:

- The contract between China Light and Power Company and its Chinese counterparts regarding the sale of nuclear power.
- The confidential Lazard Brothers Report which contains details on the project's economics.
- The part of the 1980 feasibility study carried out by China Light and Power and its Chinese counterparts that dealt with financial aspects of the project.
- The full Harwell Report now being compiled by the United Kingdom Atomic Energy Authority.
- The Preliminary Safety Assessment Report now being compiled by the French and Chinese.

Mr Fung said the seven-point suggestion was submitted to the Office of the Members of Executive and Legislative Councils yesterday as the members will discuss the issue next week.

Legco members will have an in-house meeting next Tuesday and the terms of reference of the Daya Bay ad hoc group will be discussed and endorsed.

Meanwhile, the Government Daya Bay update information paper will be distributed to members this afternoon.

The paper was prepared for members who demanded at a Legco debate last month the Government should release all relevant information on the project and in particular its economic aspects.

Opinion Poll Conducted

Hong Kong SOUTH CHINA MORNING POST in English 10 Nov 86 p 1

[Text]

In our efforts to keep our fingers on the pulse of Hongkong public opinion, the *South China Morning Post* has commissioned a leading market research company to conduct a series of surveys in the coming months.

The surveys will cover a wide variety of topics of direct concern to the people of this territory and will play an important role in gauging what they think about issues which have a major impact on their lives.

Today we publish the results of a survey into how people now feel about the Daya Bay nuclear plant, an issue that has generated more controversy than any other in recent years.

IN a dramatic swing of opinion, a new poll has found that 44 per cent of Hongkong people now believe the Daya Bay nuclear plant should go ahead.

Most of those people who now support the plant, however, stipulate that more information about safety should be published.

Despite this swing in the plant's favour, a majority of the people interviewed, 52 per cent, still believe the nuclear plant should not proceed.

Nineteen per cent say it should not be built at all, while 33 per cent say it should be postponed, with a decision on its final fate only to be taken when more information about safety is available.

The poll, conducted on behalf of the *South China Morning Post* by Marketing Decision Research, showed a 10 per cent swing in favour of the plant compared to a similar survey in September.

Thirty-eight per cent of those interviewed in the current survey said the plant should go ahead, but with more safety information made available.

Six per cent, seeing the plant as inevitable because China so clearly wants the facility, said it should be built according to plan, with no need for more safety information.

One of the reasons given by opponents of the plant was that radioactivity was a health hazard and would endanger the next generation.

They also said the plant was unsafe, or was highly explosive and that Hongkong already had enough electricity.

The opponents were afraid of a Chernobyl-type accident and said it would be difficult to evacuate Hongkong in an emergency.

The six per cent who were unequivocally in favour of the plant said they were confident there was little chance of accidents and the plant was necessary to "aid prosperity" and to help China's economy.

The $29 billion Daya Bay plant, on a site 50 km from Hongkong Island, has generated more controversy than any other issue in recent years.

All key contracts for the deal – which involves French and British firms as well as Hongkong's China Light and Power – were signed last month and the plant seems certain to go ahead.

The issue has also led to a split among Legislative Council members, although a debate last month indicated a majority were in favour of the plant proceeding.

Results of Poll

Hong Kong SOUTH CHINA MORNING POST in English 10 Nov 86 p 2

[Text]

Hongkong Opinion Polls: Opinion on Daya Bay, October

Persons interviewed 15 years and over

	Total	Men	Women	15-24	25-34	35-44	45-54	55 & over
(Number interviewed)	1232 %	570 %	662 %	280 %	344 %	225 %	139 %	244 %
The Daya Bay nuclear power station should **not** be built	19	16	23	10	18	22	23	27
Daya Bay should be **postponed** and decision made only when more information available about safety	33	31	35	40	34	35	29	24
Daya Bay **should be built** according to plan **but more information** should be published **about** its **safety**	38	42	34	44	43	36	35	28
Daya Bay **should be built** according to plan – **no need for** more **safety information**	6	9	3	5	3	5	9	9
No opinion	4	3	5	1	2	2	4	12

Changes in opinion towards Daya Bay occurred in October among both younger and older people and **among** men and women but the largest change occurred among younger women whose position now is much closer to that of younger men. Older women remain the most strongly opposed. In summary for October:

	15-34		35 and over	
Daya Bay	Men %	Women %	Men %	Women %
YES/SHOULD	49	45	51	29
NO/SHOULD NOT	50	53	48	63
NO OPINION	1	2	0	9

People's main reasons, in order of importance, for saying Daya Bay should and be built were:

- Radioactive leaks is a health hazard/would endanger next generation
- It is unsafe/safety explosion
- Dangerous, too near Hongkong
- Hongkong has enough electricity
- Fear an accident like Chernobyl
- Hongkong small, densely populated, difficult to evacuate in other parts

Those who thought Daya Bay should be delayed said:

- Safety precautions need to be examined
- Safety must come first
- Radioactivity is a health hazard
- More confident if assured of safety
- Need safety assurance because of Chernobyl accident

Those who said Daya Bay should be built provided more safety information was available mainly said:

- More confident if assured of safety
- Safety comes first

Those who said Daya Bay should go ahead regardless of more information being available said:

- Plan confirmed by China, so inevitably it will be built
- Confident there is little chance of accidents
- To progress we need new technology/ nuclear plant will aid prosperity/help China's economy

HongKong Opinion Polls is a registered name of Marketing Decision Research Co Ltd, a marketing research company.

The polls are conducted by telephone to cover a representative sample of all people aged 15 and over

Warning on Costs

Hong Kong SOUTH CHINA MORNING POST in English 11 Nov 86 p 1

[Article by Albert Chan]

[Text]

A LEADING British merchant bank commissioned by the Government three years ago to study the Daya Bay nuclear plant said the project was in the long term more advantageous than a coal-fired plant – but there were risks of higher tariffs initially.

Other documents, previously classified but released yesterday, showed that with the forecast demand for electricity, Hongkong had little choice but to find a new power source by the early 1990s.

But because of the pollution from a new, giant coal-fired plant planned for the northeast of the New Territories, the nuclear plant at Daya Bay was left as the best option.

Extracts from the Lazard Brothers report, the merchant banker study, plus a confidential financial paper from China Light and Power Co, were released as part of the Government report to the Legislative Council on tariff and safety arrangements for Daya Bay.

The council passed a motion on October 15 demanding the Government produce details "with supporting documents as do not breach commercial confidentiality."

As expected, the Government, while reproducing some excerpts from confidential documents such as the Lazard report and the CLP financial paper, censored some vital data.

Some parts of the report were left blank. One of the most important items missing was the profit margin agreed between CLP and the Chinese Government over the running of the nuclear station.

The report explained that "certain information ... such as taxation and profit rates could not be released, as it was regarded as being commercially sensitive or constituted classified State information."

With the information provided, the Government argued strongly that Hongkong would need an extra power source by the early 1990s otherwise the territory risked not having enough electricity.

"It has always been the Government's view that the most serious danger would be to underestimate Hongkong's

future requirements for electricity because the economy is so dependent on a reliable electricity supply," the report said.

It disclosed that CLP would have to construct a huge coal-fired station costing $23.2 billion at the mouth of Tolo Harbour if the Daya Bay project was dropped.

CLP's suggestion was made to the Government in May 1983 in the form of a "Financial Memorandum", part of which was reproduced in yesterday's report.

The Government commented that "no suitable site for a new coal-fired power station was immediately apparent".

It described the suggested site as "clearly not appropriate" from an environmental view.

"The problem of where to dispose of the additional millions of tonnes of fly-ash that would be produced by the station also posed problems," the report added.

The independent study carried out by Lazards and completed in 1984, however, carried a word of caution.

It said the $27 billion nuclear project "is likely to be of benefit to consumers" but added that under certain adverse circumstances such as cost overruns, delays in construction and fall in power needs in Hongkong, "the price of electricity will be higher in some years under the nuclear option than under the coal option."

As to whether Hongkong needed an extra source of power, the report quoted estimates by CLP that Hongkong would be dangerously short of electricity by the early 1990s without Daya Bay.

The CLP forecast, based on a nine per cent annual growth in electricity demand, showed there would be only 17.9 per cent reserve capacity by 1992 when construction of all Castle Peak plants have been completed, and before Daya Bay was commissioned.

Reserve capacity is the difference between the total capacity of all CLP's plants and the maximum electricity demand.

Current reserve capacity is between 35 to 40 per cent.

A low reserve capacity means the power company has barely enough generating facilities to supply adequate electricity, while a high reserve capacity means the utility has more power plants than needed and is not economic.

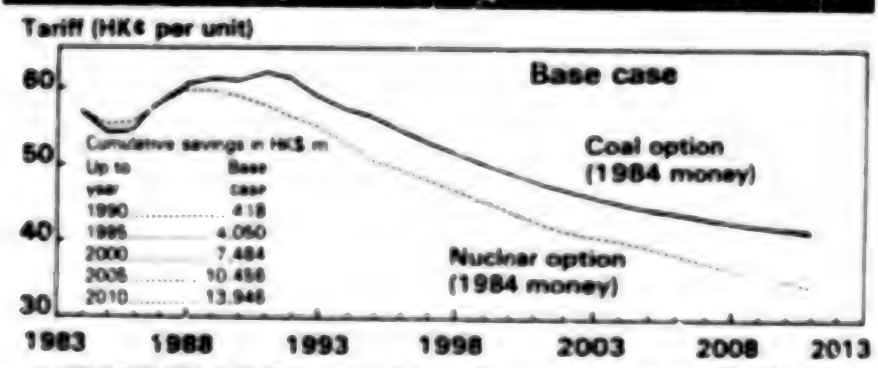
The 17.9 figure will be the lowest in CLP recent history.

The second part of the report dealt with safety aspects but most of the information had previously been released either by CLP or by the Government.

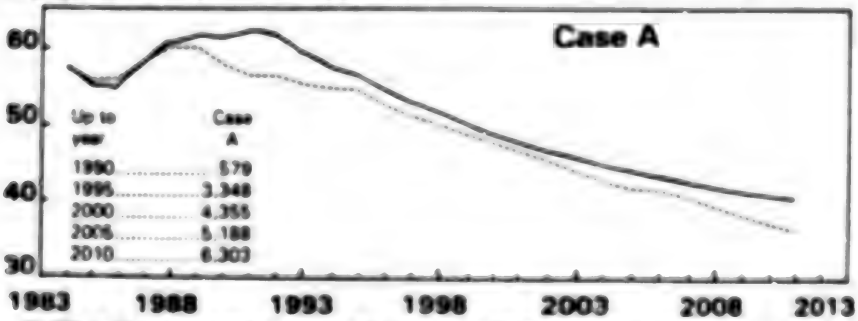
While admitting that the Government decision to support the Daya Bay project was taken before the Chernobyl disaster, the report said: "In the final analysis, it is extremely probable that Chernobyl will have no direct lessons" for Daya Bay, which would be equipped with pressurised water reactors different from the Russian reactors.

The report was delivered to all Legco members and it will be discussed in detail this morning in the meeting of the Legco Daya Bay ad hoc group.

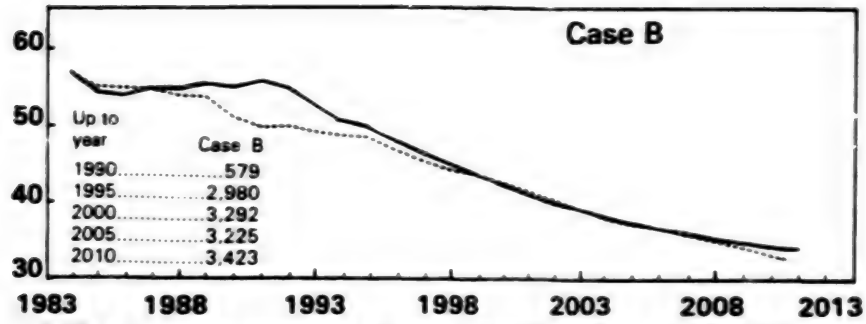
Lazard's analysis of comparative tariff rates



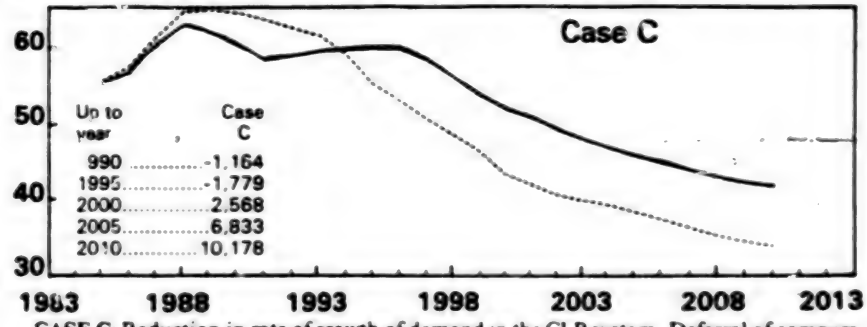
BASE CASE: This is CLP's base case showing the cumulative savings of $13.9 billion by the year 2010 at which time the cost per unit for nuclear power would be 33 cents, compared with 42 cents for coal-fired power. The 1983 cost was 56 cents per unit. The CLP case assumes the project comes on stream in time and at cost.



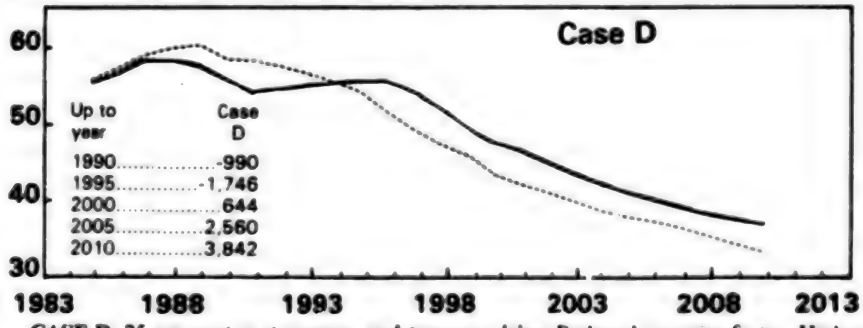
CASE A: 25 per cent cost overrun and a two-year delay. Reduced capacity factor. Higher escalation rate for nuclear fuel. Maximum rate of profit at all times.



CASE B: 25 per cent cost overrun and two-year delay. Reduced capacity factor. Higher escalation rate for nuclear fuel. Maximum rate of profit at all times. Coal price US$45 in 1984 increasing at nine per cent a year. It shows that nuclear remains cheaper than coal in the early years but there is little difference in the price to the consumer after 1995.



CASE C: Reduction in rate of growth of demand in the CLP system. Deferral of comparative coal-fired units. The price of electricity is projected to be higher for nuclear until three years after the station is commissioned, mainly due to lower demand growth. It still assumes a growth between 3.4 and four per cent: if lower, the consequences for the price of electricity under the nuclear option "would be very adverse."



CASE D: 25 per cent cost overrun and two-year delay. Reduced capacity factor. Higher escalation rate for nuclear fuel. Maximum rate of profit at all times. Reduction in rate of growth of demand in the CLP supply system. Deferral of comparative coal-fired units. Coal price of US$45 in 1984 rising at 11.5 per cent a year to 1991 and nine per cent thereafter.

Most Comprehensive Document

Hong Kong SOUTH CHINA MORNINC POST in English 11 Nov 86 pp 1, 2

[Comment by Albert Chan]

[Text]

ALTHOUGH it is almost certain that critics of the Daya Bay nuclear project will still view the latest Government effort as inadequate, the 103-page document released yesterday is by far the most comprehensive from the administration on the controversial scheme.

Judging from the data and documents in the report, most will draw the conclusion that the Daya Bay project is a good one.

But what about the remaining "classified" information?

Will these be further supportive of the Government and CLP argument that the nuclear option is superior to the coal option – or would this still-secret information shed unfavourable light on the project?

Certainly, some vital information is still missing, such as the profit margin agreed between CLP and China.

However, the report did contain some new and encouraging information.

To start with, we were told the cost of the transmission line CLP has to build to bring nuclear power to Hongkong will be $1.87 billion – a big drop on the earlier estimate which was $3 billion (as contained in CLP's 1985 annual report).

This is significant because the $1.87 billion will be calculated as CLP's fixed assets and CLP's permitted profit is based on its fixed assets.

With cheaper transmission lines, the permitted profits would be lower and the tariff would be more favourable.

The Government also tacitly told the Legislative Council that phase one of the Harwell report on risk assessment, which has so far been kept confidential, would be available to councillors on request.

The report was obtained by this newspaper a few months ago and there was a row over the findings, such as the risk assessment of the plant.

The Government has maintained that the report was not meant to be made public as it was a preliminary study and would be misunderstood and possibly create alarm.

'Determination To Conceal'

Hong Kong HONGKONG STANDARD in English 11 Nov 86 p 6

[Editorial]

[Text]

ON October 15, Daya Bay was a *fait accompli*. Just three weeks before that the Chinese authorities signed a series of contracts with the French and the British to build the two Daya Bay reactors about 50 kms north-east of Hongkong.

It was on October 15 that the Financial Secretary, Mr Piers Jacobs, promised a paper in response to a Legislative Council motion calling for details of safety and tariff arrangements of the plant together with supporting documents "as do not breach commercial confidentiality" and to explain whether such arrangements will safeguard the long-term interests of our people.

The *fait accompli* meant that there was really no point, by that date, to justify Hongkong's involvement in the project. Reduced to simple language, Mr Jacobs was only required to tell us how much is being spent on the project, how much consumers will have to pay over the years, how safe those reactors will be and what will be done for our people if something goes wrong.

Nevertheless, Mr Jacobs has gone a long, long way in his paper — released yesterday — to justify Hongkong's involvement. And brought us back to the same cul-de-sac in so far as safety is concerned.

Oh, yes, he has given us a lot of assurances. Far too much. But none which he and others in authority has not given before. The "escape" clause, as pointed out in the council debate, would allow Mr Jacobs to get out without telling us anything that we did not already know. Now he has done just that.

In 85 pages plus seven annexures, we are really assured of only two points: for the first six years of Daya Bay's operations consumers here will not be required to pay more than what they are already paying for coal-fired energy; and that contingency safety plans have been commissioned from the United Kingdom Atomic Energy Agency.

Mr Jacobs has, however, substantiated in full what Worldwatch, a watchdog group partly funded by the United Nations, concluded three years ago: "In the nuclear business, the lines between serious analysis and industry propaganda is frequently blurred, and policy making still lacks a full and

fair accounting of nuclear power's economic status."

Mr Jacob has been liberal in drawing on Western experiences, particularly those in favour of nuclear energy, to substantiate his case.

But he has conveniently ignored the most significant development since the accident at Three Mile Island in 1979 and which has been considerably boosted by Chernobyl: the trend towards full disclosures of all information demanded by the public, regardless of whether or not such disclosures are in the interests of the nuclear industry.

The one significant "disclosure" in this paper is taken from the highly-classified Lazards Brothers report which contradicts, rather than confirms the whole basis upon which the economics of Daya Bay seems to have been based. But that is neither here nor there since China has signed those project agreements.

No other aspect of Mr Jacob's paper underscores this omission more than the wishy-washy discussion on contingency planning in the event of an accident at Daya Bay.

True, the UK Atomic Energy Agency is still working on a contingency plan. "Once completed, it will be added to the range of contingency plans already held by the Government and will be regularly reviewed and kept up-to-date," Mr Jacobs adds. And leaves the matter at that.

What are these contingency plans already in hand? Do we not have a right to know? Shouldn't everybody be made conversant with them so that if anything does go wrong, all of us would know what to do?

Considering that such a minor matter as the hoisting of Typhoon Signal No 8 caused utter confusion in our public transport system, what does Mr Jacobs expects if a mere rumour of an accident at Daya Bay makes the rounds?

That Mr Jacobs is determined to conceal a lot of information about Daya Bay which the public ought to be given is evident from his brief comments on the UKAEA consultancy.

Three of the agency's reports are in hand and released to Legislative Councillors; a fourth is available *on request* by councillors.

No mention of these being made available to the public at large. It is a public that is still predominantly opposed to Daya Bay.

Safety is the average man's prime consideration as far as Daya Bay is concerned. Mr Jacobs' failure to satisfy anyone here will only further undermine confidence in the Government.

Growing disenchantment can already be seen in the escalating demand for direct elections. Many people are plainly fed-up with the Government leading them from one cul-de-sac to another.

Resort to the Legislative Council (Privileges and Powers) Ordinance by some members seems called for.

Cost of Decommissioning

Hong Kong HONGKONG STANDARD in English 13 Nov 86 pp 1, 22

[Article by Sheila Daves and Andy Ho]

[Text] **THE amount that the Guangdong Nuclear Power Joint Venture Company (GNPJVC) has budgeted for "decommissioning" the Daya Bay plant is only one-tenth of what Britain has set aside for the closure of its nuclear stations after they have served their 30-year working life.**

In its 1983 financial memorandum, the China Light and Power Company stated that the JVC would allow about 10 percent of the Daya Bay capital cost for demolishing the Daya Bay plant when its two 900-megawatt pressurised reactors are to be closed down.

Figures from expert sources abroad suggest that the real cost of closing down a reactor such as the one at Daya Bay would be more than $20 billion in excess of the amount suggested by the JVC.

"Decommissioning" refers to the technical procedures to dispose of the radioactive facilities when they have to be shut down after usually 30 years of operation.

"For this purpose, 1.5 percent of the total cost of electricity is appropriated to a decommissioning provision starting from the 11th year after commissioning. This provision, together with accumulated interest, would amount to approximately HK$3 billion by the end of the joint venture period," the document states.

The information is quoted in the recently released 103-page Govern-

ment report on Daya Bay to the Legislative Council.

But Britain's Central Electricity Generating Board (CEGB) has estimated that the cost of dismantling a nuclear station would be in the region of £400 billion (HK$ 29 billion).

Mr Andre Cregut of the French Atomic Energy Commission, on the other hand, told an international conference on decommissioning of nuclear plants in July last year that the then decommissioning cost was 40 percent of the initial investment on a nuclear plant.

A Swiss three-year study suggests that the amount would be around 20 percent of the construction cost.

The JVC's 10 percent provision, however, is in line with the observations made in the September report of the Legco fact-finding delegations on nuclear power generation.

The topic is highly controversial as no large-scale nuclear reactor has been decommissioned so far.

Experience rests largely on one small demonstration reactor at Elk River in the US which has been decommissioned. It took two years, with the facility being flooded by divers using laser tools. The exercise cost more than the cost of building the reactor.

The first large-scale decommissioning is scheduled for 1989 in the US at Shippingport when the reactor will be removed and floated down river to be buried in a prepared hole.

Three years ago, the Government commissioned the British Lazard Brothers to study the financial viability of the Daya Bay option.

Lazards director, Mr Michael Roberts, yesterday told *The Standard* in London that they had taken decomissioning into account in their study but it was a "difficult" subject.

He suggested it was impossible to say how long a nuclear power station might last. Lazards took a conservative estimate of between 25 and 30 years for Daya Bay in which they explored the economics of the project. Many nuclear power stations around the world were much older, he suggested.

He thought the Government had gone to "quite a lot of trouble" in their report. "We were not asked to judge any issues other than economic. Nobody knows what the price of coal will be for the next 20 years," Mr Roberts commented.

He recalled that no power station had been decommissioned when the report was written.

A Government spokesman yesterday told *The Standard* that the "decommissioning factor" was taken into account in the Lazards study, basing on figures supplied by China Light.

Sources in London suggested that Lazards found experiences of decommissioning world-wide so limited that they could not explore in detail the economics of this aspect of Daya Bay.

Liberal MP Paddy Ashdown, who has been monitoring safety precautions in Britain's nuclear plants for the past 18 years, said he sees decommissioning as a "step into the unkown."

He and his assistant, Mr Tony Meredith, have recently discovered serious corrosion at two 20-year-old Magnox reactors at Hinkley Point A, Somerset, while the CEGB has been making plans to extend the life of the reactors to 30 years.

In an interview with *The Standard* in London yesterday, Mr Meredith said: "Nobody really knows the cost of decommissioning. When they design a nuclear power station they think it is perfect, no account is taken of the cost of updating it over the years."

Local anti-nuclear critic, Rev Fung Chi-wood, described the JVC's 10 percent provision as "wishful thinking."

He said, quoting a research conducted by the US Public Citizen/Environmental Action group last year, the cost for decommissioning a Daya Bay-scale plant would be in the region of US$3 billion (HK$24 billion).

The GECB has proposed "entombment", or "mothballing", the aged plants as an alternative.

Mr Merdith said he knew of no research into the cost of "entombment". "Nobody knows, but I see it as cheap and safe," he said.

The Standard yesterday filed in questions to China Light regarding the latest financial and technical provisions for decommissioning the future Daya Bay plant.

A China Light spokesman, Mr Andrew Lo, said his company was not in a position to reply the questions yesterday but the issue would be taken into account in their statement on the Government report this Friday.

Meanwhile, the British Atomic Energy Authority and the CEGB are experimenting with dismantling techniques on the small advanced gas reactor at Windscale. *The Times* has recently reported that scientists have given themselves 15 years to strip it down, developing robots to get inside.

The paper also reported that Britain's first generation nuclear power station is to stand for a century as "monolithic, nuclear tombstones along the coastline."

While conventional coal and oil power stations could be demolished, nuclear reactors are to be decommissioned when they came to the end of their working life. It was an untried process with unknown risks, the paper's science editor, Pearce Wright said.

First, the buildings surrounding the reactor, many of them containing intermediate radioactive waste, would be removed, while the reactor was encased in concrete, leaving a 160-ft high structure to "cool down" for 100 years.

In Britain, the 18 original Magnox reactors, some of them approaching 30 years old, will be the first to be decommissioned. "There remains the huge problem of dumping thousands of tons of low-level and intermediate radioactive material from the fabric surrounding the actual reactor," the paper says.

In the US, state public-utility commissions also require power-reactor owners to set aside funds in reserve against the future cost of decommissioning.

Most states allow the utilities to make interim use of the earmarked sum for other purposes. But some states, such as California, Pennsylvania and Maine, have gone one step further in requiring the companies to make a deposit on their decommissioning fund. The utilities are not allowed to use the money while their reactors are still operational.

The various parties involved in the Daya Bay project have not made clear their stance on the topic.

More Figures Disputed

Hong Kong HONGKONG STANDARD in English 14 Nov 86 p 1

[Article by Andy Ho]

[Text]

PROMISES that the Daya Bay nuclear plant will produce electricity over 20 years for $30 billion less than a coal-fired station is a "distorted figure" meant to mislead the public, the head of the anti-Daya Bay coalition said yesterday.

Rev Fung Chi-wood, the convenor of the 116-group coalition, told *The Standard* that new figures that have been coming out this week show the difference between the nuclear and coal options is as low as $3.4 billion.

The $3.4 billion savings was part of a "worst-case" scenario painted by a report by Lazard Brothers, a British merchant bank that completed a financial study on the viability of the Daya Bay project.

British estimates now also show that it can cost $29 billion to close down a nuclear power plant, equal to the entire cost of building the Daya Bay operation. The Guangdong Nuclear Power Joint Venture Company has only set aside $3 billion for shutting down the $28.8 billion plant.

In a new development, Rev Fung said he had come across a Chinese-language version of a press release put out on August 16 by the Hong Kong Nuclear Investment Co (HKNIC), a 25 percent partner in the nuclear plant, which shows the savings will be only $4.5 billion in 1986 money terms.

The Chinese clause is missing in the English-language version of the same press release. In English, the promised savings are $33 billion, a figure that was widely-used by the company at the time.

"I was one of the victims fooled by the ($33 billion) figures because it was not qualified," said Rev Fung.

He explained that the public had been led to believe that the $33 billion was in the value of today's dollar.

In fact, he said, the $33 billion was the total savings for the 20 years after the plant begins operating in 1992 — and much of the savings are in future inflated dollars.

Asked about the discrepancy between the English and Chinese-language versions of the same press release, China Light spokesman, Mr Andrew Lo, said the Chinese-language clause should have been cancelled.

"Only the English version is official. The clause was included in the Chinese text probably because of mistakes made by our translators or type-setters," he said.

The Chinese-language version was given to the anti-nuclear coalition during a closed-door meeting with the Chairman of the Hong Kong Nuclear Investment Co, Mr William Stones.

Copies were handed to reporters for the Chinese press following the meeting.

But in a crucial change, the line containing the $4.5 billion savings was deleted.

"I don't recall any officials from HKNIC saying the clause with the $4.5 billion savings in it should be deleted," he explained. "I asked them in August to explain how the $33 billion figure was arrived at, but the answer from the company was that an answer would be too complicated for laymen."

The discrepancy between the English and Chinese versions only came to light recently, when Rev Fung examined copies of the August announcement. He reviewed them after reading reports in *The Standard* highlighting a $16-billion difference between the China Light estimate and the one in the Lazard Brothers report.

Mr Lo declined to explain the $33 billion savings over the coal-fired plant as made in the August announcement. He wouldn't estimate how much it would be in 1986 value terms, which would cancel out the inflation that would push it up over 20 years.

Stemmed Information Flow

Hong Kong SOUTH CHINA MORNING POST in English 15 Nov 86 p 20

[Article by S. Y. Wai]

[Text]

ANTI-NUCLEAR lobbyists pressing for full disclosure of information on the Daya Bay nuclear project will be disappointed following a statement by the Hongkong Nuclear Investment Company Limited (HKNIC) yesterday.

The HKNIC hinted that there should not be any further release of information on the $27 billion project.

It is believed that the HKNIC viewed the document on some of the findings of the Lazard Brother's study, passed on to Legislative Councillors on Monday, as the very last information that could be released either by the Government or the company itself.

Apart from praising the information included in the document as logical, objective and relevant, the company repeated in the statement that commercial confidentiality had to be safeguarded.

The statement quoted company chairman Mr William Stones as saying: "To produce more information, particularly on the commercial aspects of the agreement, would call into question the international practice of commercial confidentiality."

Though Mr Stones said the document on safety and tariff arrangements for the nuclear plant showed the Government's endorsement of the company's approach to the project, he stressed that any further disclosure of the core information would infringe the interests of many parties.

"These findings not only substantiate the approach of HKNIC, but emphasise the company's commitment to safeguard the interests of shareholders, customers and the public of Hongkong in general," he said.

On the content of the report, Mr Stones said it was interesting to find out that most of the conclusions of the HKNIC's and Lazard's studies were close to each other.

"This examination by Lazard's, carried out in isolation and independently of HKNIC, arrived more or less at the same conclusions," he said.

"An accounting procedure, to discount or not discount savings, to year 1984, was the only aspect of the report which deviates from the HKNIC conclusions."

With regard to safety, Mr Stones said the report accurately highlighted the commitment of the Chinese Government to ensuring that the highest possible standards were achieved both in construction and in the operation of the nuclear power station.

"Their efforts combined with the experience of the French, the choice of reactor and the involvement of HKNIC, will ensure adoption of the latest safety features and that the highest operational standards will be employed."

On public education, which formed part of the report, Mr Stones said, HKNIC with the assistance of the Guangdong Nuclear Power Joint Venture Company would be undertaking a comprehensive program over the next two to three years to provide the public with information on nuclear power and details of the Daya Bay project.

Regarding progress on building the plant, Mr Stones said design and manufacturing work was now under way.

Reclamation of the site at Daya Bay had been completed and excavation for the nuclear building foundations had begun.

Work on the first civil engineering contract for the construction of the nuclear island buildings had started and would lead to the first structural concrete being poured in mid-1987.

Work was also under way on the construction of site facilities and accommodation for local and expatriate staff involved in the project.

Government Decision Political

Hong Kong HONGKONG STANDARD in English 19 Nov 86 p 1

[Article by Andy Ho]

[Text]

THE Government made a "political decision" to back Daya Bay as the top-secret Lazard Brothers report "did not provide adequate justification for choosing that option."

Dr John Wright also said he doubted whether the Government had the necessary technological expertise to make an "informed and balanced" judgment on the $28.8 billion nuclear power project after his office was closed down in June 1984.

Dr Wright was formerly the Government science adviser and he had access to the report while in office.

"No one can come to a black-and-white decision on the project, judging from the report at that time. The Government's decision was a political rather than a techno-economic one," he said.

The British merchant bank, Lazard Brothers, was commissioned to study the financial viability of the nuclear power option.

Its 1984 findings were a key consideration for the

Government in agreeing to guarantee a $600 million loan for the Hongkong Nuclear Power Investment Co.

Recent developments suggest that the Government may have more than commercial confidentiality in mind in rejecting demands for further disclosure of the controversial report.

So far, only six pages of the secret document have been divulged, through the 103-page Government's Daya Bay report to the Legislative Council.

Dr Wright said the Lazard projections are "probability distributions," which yield a spectrum of estimated returns for a future nuclear plant and a conventional power station that can range from negative to positive figures.

"I would not say which of the option ought to be cheaper. The variants are so prolific and so unknown that it is anybody's guess," he said.

In an interview with *The Standard* last week, Lazard director Michael Roberts admitted to having similar difficulties in their comparison between the merits of a future coal-fired station and the nuclear alternative.

"Nobody knows what the price of coal will be for the next 20 years," Mr Roberts said, adding that the cost for closing down the nuclear facility 30 years later is another uncertainty, as experience in this area is limited.

Two years ago, the Government also commissioned the British Atomic Energy Authority at Harwell for advice on environmental and other aspects of the Daya Bay power station.

A Harwell proposal to the Government read by *The Standard* suggests that the British consultants were anticipating a parallel technical body to be set up here to tailor suggestions from Britain to meet local situations.

The Harwell proposal, dated June 27, 1984, and contained in *The Hongkong Nuclear Environment: Proposal for Initial Assistance*, says: "There are areas which self-reliance is both practicable and technically desirable (in Hongkong).

"The role of Harwell is then seen as providing advice and counselling in identifying and developing the necessary capabilities and skills in Hongkong."

Dr Wright, who was also responsible for fixing the contract terms for the Harwell studies, said there has been a poor appreciation for the importance of science and technology within the administration.

Such a local technical body, he went on, would have saved the Government from disseminating "ill-digested" information from Britain.

Also criticising the Government's "symptomatic short-sightedness" is the 7,500-strong Hongkong Institute of Engineers.

The institute has recently offered its expertise to the Government to "fill the gap, and pick up the pieces," said HKIE secretary Ken Bridgewater.

The Government's initial response to the proposal was said to be one of "great relief."

/9274
CSO: 5150/0063

BRIEFS

NUCLEAR ENERGY, LNG DEPENDENCE--Tokyo, Dec. 4 KYODO--Japan will dpend more on nuclear energy and liquefied natural gas (LNG) and less on oil and coal in the 21st century, a private energy research organization predicted Thursday. The projection, made by the Institute of Energy Economics, is based on the assumption that the Japanese economy will undergo a drastic structural change for the rest of the decade and that it will be led by exports of high technology and high-tech machines. The forecast estimates an average 3.1 percent annual growth of gross national product (GNP) from 1985 through 2000 and puts primary energy supply at 520 million kiloliters in terms of oil in 2000. The ratio of oil to primary energy supply is expected to fall to 48.1 percent in 2000 from 55.4 percent in 1985 and that of coal to 16.5 percent from 19.0 percent, it said. But Japan's dependence on nuclear energy will increase to 17.1 percent from 10.0 percent and on LNG to 12.0 percent from 9.4 percent. Coal liquefaction and methanol will be developed as new energy and power sources, but their growth will be limited, it said. Fuel cell and solar thermal electric power generation will be costly and unable to compete with traditional energy sources. New energies will account for only 0.5 percent of primary energy supply in 2000, it said. [Text] [Tokyo KYODO in English 1019 GMT 4 Dec 86 OW] /6662

CSO: 5160/021

COMMERCIAL NUCLEAR SUBMARINE ENVISAGED FOR 1989

Toronto THE GLOBE AND MAIL in English 29 Nov 86 p B7

[Article by Robert Kozak]

[Text]

A Franco-Canadian consortium developing a commercial nuclear submarine now expects to have its craft plying Canadian waters by 1989.

The submarine, SAGA-1, is nearing completion near Marseilles. Six months of sea trials with a non-nuclear engine will follow the launch, which is planned for early next year.

After several demonstrations in Europe, the sub will be brought to Canada and fitted with its reactor, but exactly where the sub will be assigned "depends on what mission we find for it," said Vince Alliot, acting president of Halifax-based International Submarine Transportation Systems.

"We are trying to find partners to support the operating costs of the submarine and where we go depends on this."

One possible use is location of mineral wealth in the North.

During the Arctic winter, "about 60 per cent of the time a regular submarine is not able to work because of bad weather, but this one will be independent of surface conditions and should be able to work at least 90 per cent of the time," Mr. Alliot said.

The craft will cost an estimated $20-million, not including its onshore facilities, but will be able to spend much longer submerged than conventional diesel vessels.

That makes the nuclear-propelled sub more "autonomous and independent," he said, and, it is hoped, more attractive to the military.

The Department of National Defence is defining what technology it needs for its Canadian Submarine Acquisitions Project, and by 1990 when the DND's first contracts are let, the nuclear sub's builders plan to be there. "We will contact the CASAP people and, hopefully, they will recognize we have a common area of interest."

ISTS is a partnership of International Submarine Engineering of Port Moody, B.C.; ECS Energy Conversion Systems of Ottawa; Isremer, a French Government agency, and Comex, a Marseilles-based construction company.

The vessel's reactor will be a souped-up version of the Slowpoke research device used in universities around the country.

Allan Kastner, ECS vice-president, said the design work for the reactor is complete and his company is ordering components. The power plant will generate about 1,500 kilowatts (compared with 20 kilowatts for a normal Slowpoke).

The ECS reactor will power the submarine, with its crew of about 15, to depths of 600 metres, where divers can be deployed.

Before that happens, however, licences are needed.

"Licencing will be all that much more difficult because the technology is new, and as soon as you focus on 'nuclear' then that requires a lot of safety documents and reviews by government people," Mr. Alliot said.

Although the consortium sent a letter to the Atomic Energy Control Board late last year alerting the regulatory agency that the group planned to run a nuclear submarine off the East Coast using a 1.5-megawatt reactor, that is the last formal notice the agency has received, an AECB official said.

The agency must approve the concept, construction and operation before the submarine goes to sea with a reactor on board.

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CSO: 5120/2

LIBERALS REJECT CRUISE TESTS, NUCLEAR ARMS

Convention Policy Resolutions

Ottawa THE OTTAWA CITIZEN in English 1 Dec 86 p A4

[Article by Jane Taber]

[Text]

In a tense and emotional debate, Liberals voted this weekend to end cruise missile testing and make Canada a nuclear weapons-free zone, reversing previous party policy.

These policies are not binding on Liberal leader John Turner and he has not supported them in the past but he's backed himself into a tight corner by telling delegates during the four-day national convention he was there to listen to their concerns.

Sunday, Turner repeated his grassroots initiative but reminded everyone the policy resolutions do not strictly bind him.

"But I consider them highly persuasive," he later told reporters when asked about the cruise and the nuclear weapons-free zone.

"They will form the general direction for the party going into the next election."

Turner said his caucus will have to "take another look" at its direction in terms of the cruise.

During the 1984 election campaign, Turner said: "I believe that (the Liberal government) made the correct decision in allowing the testing of the cruise missile.

"It is an unarmed missile, it is in furtherance of our treaty obligations to our European allies and our European partners and, if we are going to have any influence in working towards world peace, we first of all must fulfill our commitment to our NATO allies."

In 1983, the Liberal government voted to allow cruise testing.

Liberal defence critic Len Hopkins was fighting mad during the debate, warning that creating a nuclear weapons-free zone would take the country out of NATO.

"Let's face reality. We're talking about the national interest, not the emotional interest," he said.

"(It) will virtually take us out of NATO and be a disgrace to the Liberal Party of Canada."

The resolution came from Manitoba Liberal MP Lloyd Axworthy who urged the Liberal party to take "a new step in elaborating nuclear policy."

His proposal took one step further an already-adopted resolution calling for the government to stop the testing of the cruise.

"A nuclear free zone clearly demonstrates to Canadians that our objective is to pursue a new world."

Said Liberal MP Warren Allmand: "This resolution is not simply a question of the quality of life, but a question of survival of life."

An angry Hopkins said later in an interview the resolution means that if any NATO allies such as Holland, Germany, Italy, Britain or the United States come into Canadian harbors with nuclear weapons on board their ships, Canadians would not be able to fuel them or provide maintenance.

"This means non-co-operation with our NATO allies and therefore if you don't co-operate in an alliance, you don't belong to one."

However, Hopkins says he takes some comfort in the fact that one other resolution which was passed called for Canada to stay in NATO and use its role in that organization to promote peace.

He says it is now up to the caucus and the party to see how they will deal with the two resolutions, and which one will become Liberal policy.

TORONTO STAR Editorial

Toronto THE TORONTO STAR in English 1 Dec 86 p A16

[Editorial]

[Text]

For the first time since 1963 and the crisis over Bomarc missiles, Canadians appear poised for a debate on nuclear weapons and their country's involvement in their use and development.

Back then, the Liberal party favored stationing nuclear missiles in Canada as part of the country's alliance commitments. But this past weekend, the Liberals voted to ban cruise missile tests and to make Canada become a "nuclear weapon-free zone."

For the Liberals, this policy statement represents a dramatic shift — not only from their stand in 1963, but also from their position just three years ago. Then, the Liberal government signed the controversial accord with the United States permitting the testing of cruise missiles in our North.

The Liberal convention stand also follows closely on the heels of a similar vote by the Ontario Legislature declaring this province to be a nuclear weapon-free zone. Also this month, the True North peace conference in Edmonton, which addressed the same issues, attracted a surprising 5,000 people. Delegates voted to urge the federal government to consider making Canada a "neutral" country and end its limited endorsement of the U.S. Star Wars program.

Clearly something is up here.

The problem is that the debate is taking place in a vacuum. If we are to renounce nuclear weapons in every way (for example, aboard submarines that visit our ports), should we stay in NATO and NORAD? Would we be allowed to? Are we more effective in working toward peace inside or outside military alliances? Should we stay in NATO but change our role? Should NATO renounce first use of nuclear weapons? Would that mean a build-up of conventional forces?

These are questions that ought to be addressed. A good starting point would be a government white paper on defence, long promised but still undelivered. The public increasingly seems anxious to debate these issues, even if the government isn't.

OTTAWA CITIZEN Editorial

Ottawa THE OTTAWA CITIZEN in English 2 Dec 86 p A8

[Editorial]

[Text]

If the sheer volume of resolutions debated at the Liberal party convention is any indication, Liberals have plenty to say about what this country's foreign policy should be. Unfortunately, in light of Canada's role in the world, not all of it makes sense.

It's healthy that interest in foreign affairs is so high in Liberal circles. What's needed now is more focus, realism and maturity, based on greater knowledge and a sense of the meaning of partnership among like-minded nations. A look at the perceptions of Louis St. Laurent and Lester Pearson would help for starters.

At the Ottawa conference, the focus in non-domestic matters was on free trade, cruise missile testing, a nuclear weapons-free zone for Canada and NATO membership.

What emerged was a vision of a Canada groping for bilateral, sectoral and multilateral free trade all at once. A Canada denying NATO's superpower access to our territory to test unarmed cruise missiles or to dock its ships. A Canada, in short, still inside NATO but in some indeterminate way trying to promote peace with the rest of the world.

Liberals also agreed to maintain foreign aid at least at its present level, and allow more immigrants to come to this country.

All in all, quite a mixed bag. To give it more coherence, newly-confirmed party leader John Turner would do well to focus on principles first. We suggest the following:

- The principle of free trade should be synonymous with Liberalism. While a univeral GATT solution must be pursued — even Brian Mulroney is doing that — priority should be given to lowering Canada-U.S. trade barriers. The American market is essential to Canadian prosperity.
- Canada's security policy has to be an alliance one. Membership in NATO is the best guarantee of maximum freedom of manoeuvre for Canada vis-à-vis the U.S.

But it entails responsibilities as well as rewards. One of these is that matters affecting the defence of alliance territory have to be settled together, not unilaterally. We cannot become a nuclear weapons-free zone unless and until NATO determines that should be its policy. Otherwise it just doesn't make defence sense.

Testing the cruise or any other weapons in Canada is not a principle. It's simply helping an ally strengthen a deterrent that helps prevent war and preserve peace. If we don't want to help in that way, we don't have to.

If Turner sticks to alliance principles, he won't go far wrong. If he strays very far from them, he'll be courting trouble.

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CSO: 5220/17

OPERATIONAL EXPERIENCES AT PAKS NUCLEAR POWER PLANT

Budapest ELEKTROTECHNIKA in Hungarian No 9, 1986 pp 326-329

[Article by Geza Jarfas, graduate mechanical engineer, chief engineer of the Paks Nuclear Power Plant Enterprise: "Operational Experiences at the Paks Nuclear Power Plant"]

[Text] At the time this article was being compiled we had experience with placing into operation a total of two blocks at the first Hungarian nuclear power plant and with operations and maintenance for nearly five reactor years.

The structure decided upon thus far for the Paks Nuclear Power Plant calls for four VVER-440 blocks. About thirty of these blocks already operate in the socialist countries and in Finland, so we are talking about a relatively large series.

The times for the first parallel connection of the four blocks are:

Block No I was on 28 December 1982;
Block No II was on 6 September 1984;
Block No III is expected in September 1986; and
Block No IV is expected in December 1987.

1. Electric Power Production and Use

In the interest of fitting the production of the nuclear power plant into the Hungarian power system it will be useful to briefly describe the production of power.

Figure 1 shows the production and consumption of electric power.

It can be seen that since 1952 we have been importing (primarily from the Soviet Union) more and more electric power, in both absolute and relative terms.

Figure 2 shows the fuels used to produce electric power, according to type, between 1974 and 1984. It can be seen clearly from the diagram that despite the first oil price explosion in 1973 the share of oil, up to 1978-79, increased further, to the detriment of coal use, while the volume of natural

gas also gradually increased. With the appearance of nuclear power the use of both fuel oil and natural gas decrease, the volume of coal being practically unchanged.

Figure 3 shows the expected use of basic energy sources up to 1990. Considering that by 1988 all four blocks will be in operation the share of nuclear power increases quickly until then but increases only slowly thereafter.

Up to 1988 the use of hydrocarbons decreases precipitously, thereafter it will increase slightly but gradually because a part of the extra need for electric power can be met only by increased use of the existing oil burning power plants.

So the ratio of the use of the various fuels will develop according to Table 1:

Table 1.

	1980	1985	1990
Coal, percent	50	42	39
Hydrocarbons, percent	50	41	30
Nuclear power, percent	—	17	31

2. Experiences in Putting the Blocks Into Operation

Complex start-up programs precede the first parallel connection of nuclear power plant blocks--primarily in the interest of safety. The start-up phases can be divided into two groups. In the first group are providing the electric power, cleaning up the technological systems, operational tests of them, and finally operational tests of the electric and control systems.

The chief phases of start-up are in the second group. The seven chief phases are: pressure test and circulation washing; first revision; hot run; second revision; pressure test and solidity inspection of hermetic area; physical start-up; energetics start-up.

In accordance with the Hungarian practice the pressure test and circulation washing, the physical start-up and the energetics start-up are tied to official authorization.

A great national economic interest attaches to achieving parallel connection of each block as soon as possible so it can produce power for the system, but only with the strict condition that in the course of the chief phases the block satisfies the conditions contained in the plans and safety prescriptions.

The work programs contain the program for the chief phases in detail.

The necessary preparedness is a very important part of the work programs; such preparedness is a condition for starting the program. In the course of putting the two blocks into operation, and partly putting Block III into operation, it could be unambiguously established that the suitable preparedness of the block

is necessary even for the first chief phase; in the contrary case the following phases will be delayed and their durations will increase. It was our unambiguous experience that suitable preparedness is a fundamental requirement.

Preparedness can be well illustrated by control technology preparedness, thus by the tests and motor armatures which have been put into operation (Table 2).

Table 2.

	Put into operation by the beginning of circulation washing (each)	Put into operation by the beginning of the hot run (each)
Tests		
Block I	1,053	2,343
Block II	1,943	3,690
Block III	2,630	--
Motor armatures		
Block I	635	1,466
Block II	1,165	1,567
Block III	1,465	--

Notes: In the case of blocks I and III the two blocks have common equipment, not the case with Block II, so the preparedness of Block III is about the same as that of Block II.
We experienced unamibiguously that at least the preparedness of Block II is necessary to begin the chief phases.

In Table 3 we give the actual duration of chief phases and of assembly between chief phases (see also Figure 4).

Table 3.

	Time Required (days)			
	Block I		Block II	
Circulation washing	23		20	
First revision	51		38	
Assembly time		39		40
Hot run	75		40	
Assembly time		6		46
Integration inspection	9		7	
Second revision	41		38	
Assembly time		62		4
Physical start-up	55		34	
Other time, total		7		5
Total	254	114	177	95
Grand total	368		272	

The duration of the chief phases for Block I up to the first parallel connection had been planned at 178 days, in contrast to which it took 368 days. The large delay was primarily a consequence of inadequate preparedness.

Let me add a few notes more to what is contained in the table:

--The first revision at Block I was substantially longer because there were problems with the drives of the control rods;

--The hot run at Block I was extraordinarily long due to inadequate preparedness;

—The integral solidity tests were performed successfully at both blocks in a very short time, because they were well prepared and the hermetic area was adequately solid;

—The duration of the physical start-up was substantially reduced at Block II because a number of tests were shortened, on the basis of the experience gained at Block I, or use of them had become superfluous.

3. Experiences With Operations

Table 4 shows the production achievements for the past 3 years.

Table 4.

	Block I		Block II		Total	
	Produced (GWh)	Output Used (%)	Produced (GWh)	Output Used (%)	Produced (GWh)	Output Used (%)
1983	2,473	66.4	--	--	2,473	66.4
1984	2,784	75.3	982	78.5	3,766	76.1
1985	3,194	83.4	3,287	86.2	6,481	84.7
Total	8,451	75.8	4,269	84.3	12,720	78.6

One can see in Figure 5 that the two blocks are in first place among the 90 blocks studied.

It is obvious that the quantity of electric power not produced because of the duration of reloadings and other planned maintenance during the year or due to failures and other irregularities influences annual production and the use factor.

In Table 6 we have shown the amount and the percentage value of the electric power production lost for various reasons, in addition to maintenance. We have given the data for the two blocks together.

Table 6.

Reason for loss:	Lost Production 1984 (GWh)	1984 (percent)	1985 (GWh)	1985 (percent)
0. All loss of load	134	100	238.4	100
1. Loss of load	93	69.5	96.3	39
1.1 OVT* schedule		2.3		1
1.2 Weekend maintenance		18.1		30
1.3 Irregularities		49.1		8
2. Forced drop out	41	30.5	142.1	61
2.1 Breakdowns		27.5		42.5
2.2 Irregularities		3		18.5
3. Loss of load (1) by cause		100		100
Primary cycle		7.8		53.8
Secondary cycle		58.7		30
Electric equipment		26.2		7
Control technology		3.5		0.2
Operational error		0.5		—
Outside cause		3.3		9
4. Forced drop out (2) by cause		100		100
Primary cycle		20.4		48.9
Secondary cycle		39.6		22.4
Electric equipment		22.4		18.3
Control technology		7.8		1.2
Operational error		1.2		6.6
Outside cause		8.6		2.6

* OVT=National Electric Power Lines Enterprise

The operational experiences can be summarized as follows:

--As can be established from the foregoing tables the blocks are operating very well, the magnitude of losses due to irregularities is relatively small;

--It is worthy of note that the extraordinarily cold weather in the winter of 1984-85 did not influence the operability of the blocks--in contrast to the operability of the coal power plants. We can report that the nuclear power plant blocks are not sensitive to bad weather conditions;

--It can be established from Table 6 that failures in the mechanical systems and equipment of the primary and secondary cycles cause the greater part of the loss of production. Failures are more numerous in the secondary cycle according to the figures. In our experience there are two reasons for this. On the one hand, in the course of putting it into operation, the systems and equipment of the secondary cycle are operated much less than the primary cycle systems, so the problems appear later. On the other hand the failures due to erosion are of greater magnitude. There were rather many problems with the

pipe systems of the high pressure pre-heater; the heating steam condensate lines erode; and there are many problems with the armatures of the feed water and fresh steam systems;

--In the primary cycle the loss of production was caused primarily by failure of the feed water check valves of the steam generators.

4. Maintenance Experiences

Since the operability of the blocks is good it is possible to increase electric power production or the use factor practically only by decreasing the duration of reloadings.

So far there have been three reloadings in the two blocks; Table 7 shows the duration of these.

Table 7.

	Duration of Reloadings (calendar days)	
	1984	1985
Block I	74	45
Block II	--	47

The first reloading of Block I in 1984 was planned for 60 days but a fault was found with the reactor which had to be fixed under the guarantee of the delivering firm but they did not start the repair in time.

The two reloadings in 1985 were done in 45 and 47 days. It can be hypothesized that the duration of partial reloadings can be gradually reduced to 30-35 days, partly because more experience is available and partly because maintenance times, especially for turbines, can be substantially reduced with various measures.

The work times turned to maintenance during reloadings also show a good trend. We show this in Table 8.

Table 8.

	Maintenance Work Time During Reloading (1,000 hours)		
	Block I		Block II
	First reloading	Second reloading	One reloading
Mechanical and construction	122	137	99
Electrical work	32	22	23
Control technology work	48	17	24
Jobs connected with quality control and inspection	5	4	3
Total	207	180	143

According to what is contained in the table the total work time is gradually decreasing. The reason for this is partly the greater experience with maintenance and the fact that the number of remodeling jobs is decreasing. But

it cannot be presumed that the work time turned to reloading will be substantially less than 150,000 hours even in the future.

Maintaining operability and eliminating irregularities requires much maintenance work time even during the year. We publish data pertaining to this in Table 9.

Table 9.

	Maintenance Time During the Year (1,000 hours)	
	1984	1985
Mechanical	310	361
Electrical	99	142
Control technology	45	64
Total	454	567

5. Summary

As we have proven with figures above the operability of the two operating blocks is very favorable. We trust that with a further reduction in the number of failures but especially with a reduction in reloading times the use factor can increase further. We also trust that Block III, being put into operation, and Block IV, still being assembled, will operate with at least as favorable results.

On the basis of all this it can be expected that in the years ahead the 1,760 MW capacity nuclear power plant will be a determining base for the Hungarian electric power system.

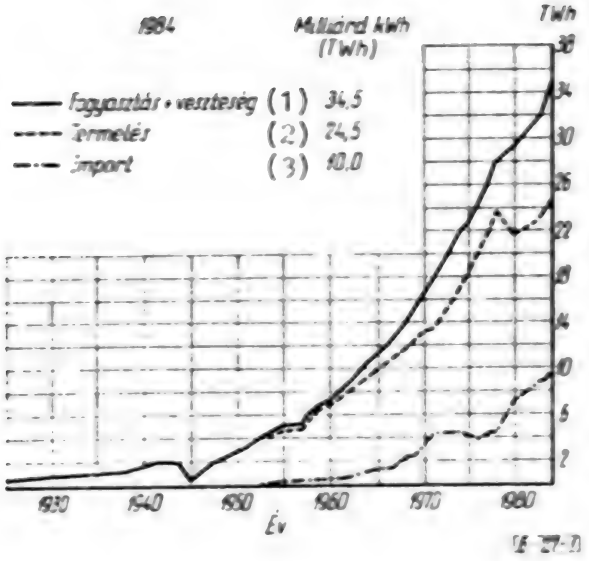

Figure 1. Electric power production and consumption in Hungary

Key

1. Consumption and loss, 34.5 billion kWh in 1984
2. Production, 24.5 billion kWh in 1984
3. Import, 10.0 billion kWh in 1984

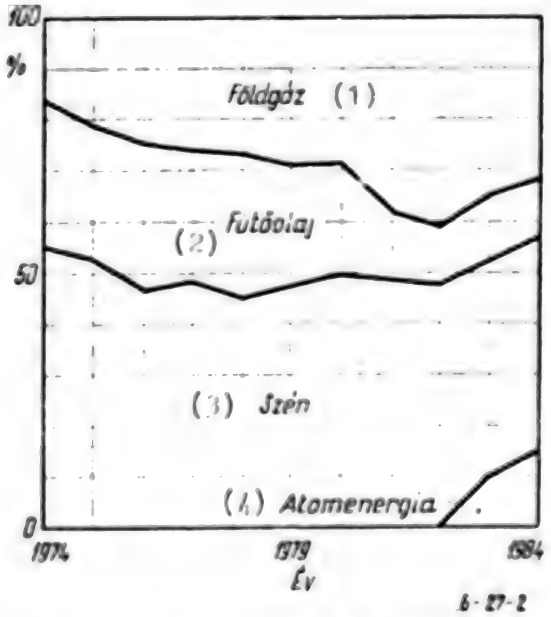

Figure 2. Electric power production of the power plants of the Hungarian Electric Works Trust according to type of base energy fuel

Key

1. Natural gas 2. Fuel oil 3. Coal 4. Nuclear energy

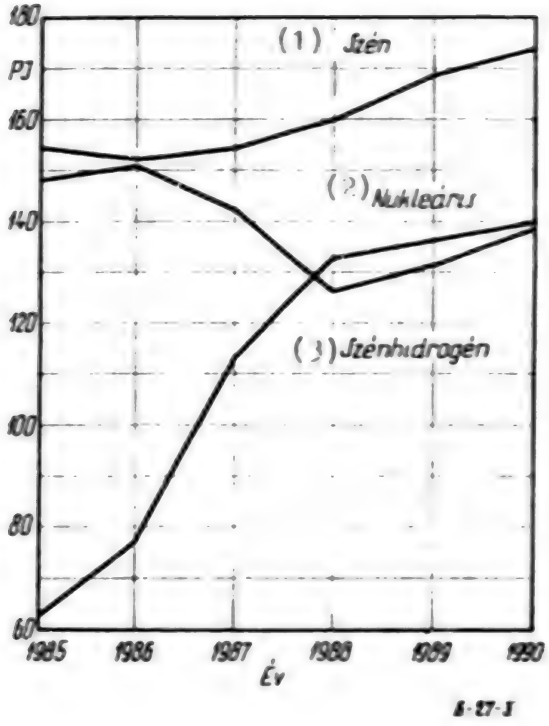

Figure 3. Expected development of volumes of base energy fuels used for electric power production

Key

1. Coal
2. Nuclear
3. Hydrocarbons

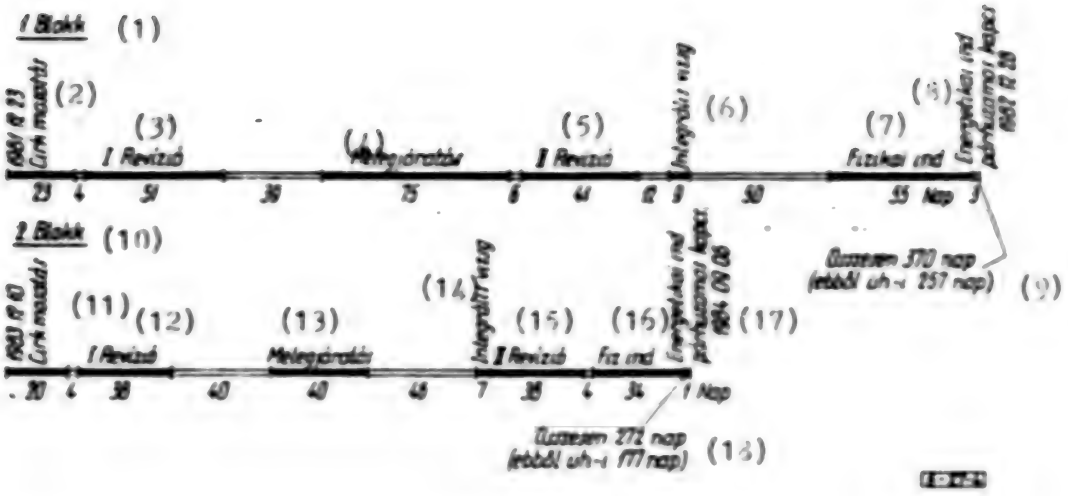

Figure 4. Rate of work putting blocks into operation (actual)

Key

1. Block I
2. Circulation washing (started 12/23/81)
3. First revision
4. Hot run
5. Second revision
6. Integrity test
7. Physical start-up
8. Energetics start-up
9. Parallel connection (12/28/82, total 370 days of which 257 spent putting it into operation)
10. Block II
11. Circulation washing (started 12/10/83)
12. First revision
13. Hot run
14. Integrity test
15. Second revision
16. Physical start-up
17. Energetics start-up
18. Parallel connection (09/06/84, total 272 days of which 177 spent putting it into operation)

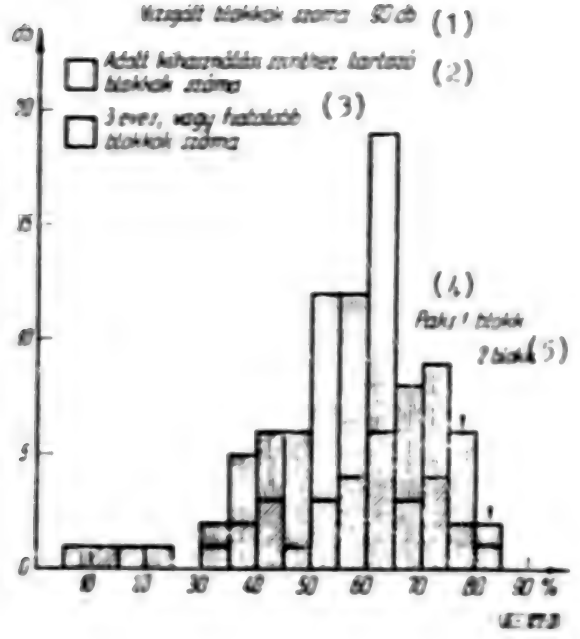

Figure 5. Distribution of the output utilization factor for all operating time of pressurized water nuclear power plant blocks with output greater than 500 MW

Key

1. Number of blocks studied, 90
2. Number of blocks belonging to the given utilization level
3. Number of blocks 3 years old or younger
4. Paks Block I
5. Paks Block II

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CSO: 5100/3002

MAIN SAFETY INSTALLATION AT PAKS NUCLEAR POWER PLANT

Budapest ELEKTROTECHNIKA in Hungarian No 9, 1986 pp 330-337

[Article by Gyula Lovass, graduate mechanical engineer, chief of a main department in the Power Plant and Network Planning Enterprise: "The Chief Safety Equipment of the Paks Nuclear Power Plant and the Electric Power Supply For It"]

[Text] The first nuclear power plant of our country is being established beside the Danube on the outskirts of Paks in a cooperation based on a Soviet-Hungarian inter-state agreement signed in 1966. On the basis of the agreement and domestic government decisions the construction of four reactor blocks, each with an electric output of 440 MW, has been going on since 1974. Construction is expected to be completed by 1988.

The first block has supplied electric power to the national net since December 1982, the second since September 1984, with very good operational experiences as the operation of nuclear power plants goes. Thus our country also has joined the ranks of countries using atomic energy; in 1985 the Paks Nuclear Power Plant provided 17 percent of the electric power consumed by the Hungarian electric power system. The third block was connected to the national net recently, in September 1985, and the fourth block will be put into operation by the end of 1987. Thus, when the 1990's begin, nuclear fuel will cover 22 percent of the expected output of our electric power system and 26 percent of the electric power consumed. The chief technical data of the power plant can be seen in Table 1.

Table 1. Chief Technical Characteristics of the Paks Nuclear Power Plant

Number of blocks	4
Reactor:	
Nominal electric output of reactor block	440 MW
Thermal output of reactor	1,375 MW
Fuel cassettes	312
Control and safety cassettes	37
Fuel loaded (metallic uranium)	42 tons
Enrichment of fresh fuel	3.5 percent

Table 1. continued

Primary cycle:		
Number of loops	6	
Operating pressure	123	bar
Volume of heat carrier	219	cubic meters
Temperature of heat carrier at steam generator entry/exit	297/268	degrees Celsius
Circulation of main circulating pump	7,100	cubic meters/hour
Electric output with cold water	1,600	kW
Volume equalizing electric heating	108 x 15	kW
Secondary cycle:		
Saturated pressure of steam produced in steam generator	46	bar
Production capability	450	t/h
Number of turbine groups	2	
Turbine:		
Steam pressure, saturated	44	bar
Steam consumption	1,338	t/h
Feed water preheating stages	3	high pressure
	1	degasser
	5	low pressure
Turbine condenser cooling water	13.5	cubic meters/s
Number of feed pumps (per two turbine blocks)	5	
Volume of water moved	850	cubic meters/h
Lifting height	714	m
Turbogenerator:		
Electric output	220	MW/250 MVA
Terminal voltage	18.75	kV
Number of diesel groups	3	per reactor block
Motor output	1,800	kW
Generator output	2,500	kVA

The Chief Equipment of the Nucelear Power Plant

Built into the heat producing equipment of the Paks Nuclear Power Plant is a further developed version of the so-called Novo-Voronyezh type pressurized water (VVER or PWR) thermic reactor which has been operating in the Soviet Union for more than 20 years. The fuel is mildly enriched uranium dioxide encapsulated in a sealed zirkonium cartridge. The neutron slowing and heat carrying medium is water (light water). About two thirds of the nuclear power plants in the world today operate with this type of reactor. Regulation of the heat production of the reactor and the operational and breakdown operations of starting and stopping take place with control rods containing boron carbide. During regulation the rods are moved by motors fed at low frequency; a breakdown stop takes place by dropping, by gravity. One operational tour for a reactor is 11 months; during this time one third of the fissionable material in the fuel loaded is used up. At the beginning of the tour we put a few

percent boric acid into the heat carrier; this is gradually drawn off during operation. This binds the initial higher reactivity reserve thus improving regulation (boron regulation).

Between two tours the used fuel is lifted out of the dismantled reactor during reloading and is stored in a resting basin located right beside the reactor for a rest of at least 3 years. Thereafter the used fuel can be transported in suitable protective containers. The used fuel contains fissionable material which can be reprocessed for fast reactors. Such a plant for the reprocessing of used fuel from the nuclear power plants of CEMA countries has not been established thus far so the countries are storing their fuel.

The six loops circulating the heat carrier, each with a steam generating heat exchanger, a main circulating pump and two shut-off armatures, belong to the primary cycle connected directly to the reactor container (see Figure 1). A volume equalizing system controls the pressure of the primary cycle; it is connected to a part of a loop which cannot be shut off, a high pressure container filled to a determined level with heat carrier. Pressure is increased by turning on electric heating bodies built into the water area and is decreased by spraying from the cold branch of the loop. The safety valves of the primary cycle are connected to the steam side of the volume equalizing system; a bubble container absorbs their run off.

A high pressure water purification system connected in parallel constantly purifies the heat carrier; the heat carrier is cooled through a regenerative heat exchanger and filtered through ion exchange filters. It consists of two parallel branches, one with a mixed bed filter and the other with a cation-anion exchange filter.

The additional equipment for purifying the heat carrier is low pressure, connected to the primary cycle through pressure reduction equipment. First the low pressure and cooled primary water goes through a boron control degasser (it gets its name from the fact that the boric acid added for control purposes is drawn off through this route) where the hydrogen gas and possible other active gases arising during operation of the reactor must be removed. Then there can be chemical filtering and other treatment. The primary cycle water taken out is replenished in accordance with the fluid level of the volume equalizing system by make-up water pumps through the make-up water degasser; in the interest of precise control these pumps are equipped with hydraulic drives also.

The larger part of the additional equipment belonging to the contaminated zone of the nuclear power plant serves to purify, treat and condense radioactive fluid materials. These materials are removed from the heat carrier of the primary cycle partly in an organized way (in the form of drainage) and partly in an unorganized way (discharges, etc.). They cannot be released into the environment; after being condensed they are rested in storage containers in the area of the nuclear power plant for at least 5 years. The nonregeneratable ion exchange resins of the purification equipment are similarly stored. After resting the wastes will go, in suitable packaging, to final storage in the area of the country; creation of this final storage site has begun.

The additional equipment of the contaminated zone serves to purify the radioactive gases extracted from or given off by the primary cycle heat carrier and to ventilate the areas in the zone. After purification the air exits through the ventilation stack.

The two steam turbines fed through the main steam line system, the feed system and the cooling system of the reactor belong to the secondary cycle of the reactor block starting from the steam generators (see Figure 2).

The saturated steam steam turbine has one medium pressure and two low pressure housings, with a precipitate depositing steam superheater heated from fresh steam connected after the medium pressure housing. The preheating system is supplemented by warming heat exchangers heated by tapping, to provide central heating for the plant area and the city of Paks. When starting up or in the event of a breakdown the by-pass equipment belonging to the turbine leads the steam produced to the turbine condensers. The turbine condensers are fresh water cooled; they get cooling water from the Danube through a single step pumping site in a volume about twice that of a traditional power plant.

The cooling system for the reactor consists of coolers and reducing equipment which can be connected to the fresh steam lines. In the first phase of cooling it operates as a steam cooler, then in the second phase it acts as a water cooler, after filling the proper part of the steam system with feed water. The refeeding of the cooled medium takes place through the feed system.

The generators of the turbine groups feed the 400 kV net through machine transformers (see Figure 3). The chief direction of auxiliary plant power supply is the three coil auxiliary plant transformer fed from the generator terminal; reserve supply is provided by a transformer connected to the 120 kV net. The SF_6 system 400 kV switching equipment has a one and a half interrupt coupling; the 120 kV switching equipment is traditional with two collecting bars. The 6 kV auxiliary plant is one collecting bar encapsulated equipment with a double auxiliary bus; the 0.4 kV plant is one collecting bar encapsulated equipment with chained multiple feed. In addition the auxiliary plant has equipment to supply safety current, which was not necessary in the case of traditional power plants.

Nuclear Power Plant Breakdowns

The nuclear safety of a nuclear power plant depends on the totality of those measures, protective and other equipment and checks with which one can prevent, during all the time that active materials are present, the appearance to an impermissible degree of activity in the environment of the equipment.

The chief source of active materials is the active zone of the reactor, where active fission products arise in the fuel in the course of the chain reaction and where, in addition, the neutron flux of the zone activates the corrosion products passing through it with the water. In the interest of reducing the volume of corrosion products the equipment of the primary cycle is made of stainless steel. In normal operation the fission products remain within the sealed zirkonium cartridge of fuel; they get out into the water of the primary cycle if the cartdridge fractures as a result of local overheating in the course of some operational irregularity.

Of the breakdowns of nuclear power plants special attention must be paid, from the viewpoint of nuclear safety, to those in the course of which the volume of the heat carrier in the primary cycle suddenly decreases as a result of equipment or pipe breaks or error. (The Anglo-Saxon literature defines this with the expression LOCA, "loss of coolant accident.") In this case a large quantity of active water (wet steam) gets into the environment. It can happen that the active zone remains without a cooling and moderating medium, can go partly or completely dry, and can melt. In such a case the heat development becomes uncontrollable, it can reach several times the nominal value, it can melt its surroundings and a very large quantity of activity is released. This certainly must be avoided, so the chief task of breakdown prevention is to ensure a continual water supply to the active zone, cooling down the reactor as soon as possible.

In the course of a breakdown the protection of the environment can be ensured if the equipment which could hypothetically fail is placed in a pressure sealed building which ensures that activity of an impermissible magnitude cannot get out of it and that it will remain hermetically sealed while the breakdown is dealt with despite the damaging effects of natural catastrophes. Such a hermetically sealed area has been made to isolate the appropriate equipment of the Paks Nuclear Power Plant. (The figure shows its boundaries with the thick dashed line.) Its walls are covered with very carefully inspected sheeting. In the course of a breakdown the pipelines leading through the boundary are shut off by three pneumatically operated armatures connected in series; the electric circuits are connected to specially packed cables.

Basically two technical measures are needed to deal with a breakdown of this type:

—stepped up inspection of equipment during manufacture and assembly and when it is put into operation and periodically in the course of operation, by materials testing and other means, and

—use of self-operating passive and active defenses and equipment which will reliably localize and avert the breakdown.

In theory the greatest breakdown which can be hypothesized in a pressurized water nuclear power plant which can be averted by self-operating passive and active defenses and equipment can be defined by phenomena produced by a break in any equipment element in the primary cycle heat carrying pressure system. The world practice today dimensions such defenses to the effects arising in the event of a full cross section, instantaneous break of the cold branch of a primary cycle loop (the largest pipe) in the vicinity of the reactor stump. The Paks Nuclear Power Plant was so constructed also. Since the breakdown serving as a basis for dimensioning could be different, depending on what was decided, we use the term "safety philosophy" for the decision.

In the course of establishing a nuclear power plant the hypothesized breakdowns, their effect on the environment and the measures taken to avert breakdowns are carefully analyzed in order to prove that the equipment can be operated safely. This analytical document, the "safety report," requires

official approval.

Chief Technological Systems for Dealing With Breakdowns
Some of the breakdown prevention systems are passive; they have in themselves the medium and energy needed to work and their effective operation takes place without any outside intervention.

The other parts of the systems are active and require auxiliary power. Since one cannot count on every element of such an active system operating reliably (even if carefully tested previously), three independent systems are set up in the interest of greater reliability. Each one of these has full potential and value in itself, and the breakdown signals activate all three simultaneously. Thus there is very great probability that at least one system will perform its task.

The breakdown prevention systems must be put into operation if, among the operating technological parameters, the pressure of the primary cycle drops with great speed or to a dangerous value, if the water level in the volume equalizer drops to a great degree, if the water level drops significantly in the steam generators, or if the speed of the steam pressure drop is great.

The breakdown cooling of the zone consists of a high pressure cooling system, a passive cooling system and a low pressure cooling system. It is the task of each to put into the active zone enough boric acid containing water to effectively shut down the chain reaction and keep it so in both the warm and cooled state (see Figure 4).

The regulating and safety protection system stop the power production of the reactor; the main circulating pumps also help draw off the heat with the rather long run-down of their increased inertia turning parts. The systems function in accordance with the pressure of the injured primary cycle. The water fed in from the storage containers flows through the fault site into the area, from there, as it cools, the pump feeds it back into the reactor through the suction lines of the low pressure system. Thus the breakdown cooling is continuous. The passive cooling system operated by nitrogen cushion pressure is a four container unit; there are three independent high pressure and low pressure pumping cooling systems with separate containers and coolers.

Pressure reduction for the hermetic area consists of two systems. The passive pressure reducer is a pan liquid cooler working with through bubbling, which is located in a building connecting with the flow-through channels to the equipment of the primary cycle (see Figure 4). The steam-air mixture appearing in the hermetic area with excess pressure flows toward the pan liquid cooler, its moisture content precipitates in the course of flowing over the pans, the air whirled along with it is stored in the airlock areas behind it. The active pressure reduction is area cooling by spraying the hermetic area with a part of the circulated water of the low pressure zone cooling.

The combined effect of the two pressure reduction systems is a reduction in the overpressure demand on the hermetic area building; after the first quarter hour of the breakdown the pressure of the area will be less than that of the environment and flow out through possible gaps in the seal will end.

In the course of a breakdown the equipment of the breakdown feed system and the auxiliary breakdown feed system function as a safety system to supply water to the steam generators (see Figure 2). The two pumps of the breakdown feed system function in place of the operational feed pumps, to make up smaller feed water losses. In the event that the steam generators are emptied to a greater degree the auxiliary breakdown feed system goes into operation; its three pumps fill the steam generators via an independent system from reserve desalinated water containers.

The cooling water supply to the safety systems comes from a separate Danube pumping station, independent of the condenser and other cooling water supply (see Figure 5). It consists of three independent systems; its pumps and chief lines are common for the two reactor blocks. Its passive part is cooling water stored in a container on the roof of the building; if the Danube pumps shut down it provides a reserve sufficient for a few minutes. If the breakdown takes place during the operational cooling of the reactor the breakdown cooling of the zone is not necessary. But the cooling equipment then in operation, the make-up water system for the primary cycle (Figure 1) and the cooling system (Figure 2) must be kept in continual operation.

What has been said thus far pertains to breakdowns of equipment operating under reactor pressure and some of the equipment belonging directly to it. But going beyond this there could also be a breakdown with any low pressure equipment carrying active material as a result of which active material could get into the environment. So all such equipment is located in the so-called contaminated zone, which is suitably sealed off from the external environment. The technologies located within the contaminated zone have devices and manipulation containers, with adequate biological protection, ventilation and sewerage, which make possible the interruption of operations and are not sensitive to the continuity of the power supply.

Safety Power Supply for the Auxiliary Plant

Continual supply to the consuming parts of the active safety systems makes necessary an addition to the customary feed system of a power plant auxiliary plant because in the course of a breakdown there could be a simultaneous loss of power plant operation and network reserve feed. Two tasks must be solved in the course of making this addition.

Uninterrupted feed must be ensured for the measurement, protection and operating equipment participating in generation and transmittal of breakdown signals, the so-called category 1 consumers, which require partly direct current and partly alternating current power. The source for this is an independent storage battery installation with a motor generator transformer to supply the alternating current consumers.

Within the shortest possible time an independent feed must be provided for the consumers needed to deal with the reactor plant breakdowns we have mentioned;

these are the so-called category 2 consumers. These require high power alternating current; a group of diesel motor generators is used as a power source. The connections of the auxiliary plant built up in accordance with the above can be seen in Figure 3; the electric motor outputs of the consumers connected to the safety power supply are contained in Table 2. The power for the diesel group for blocks 1 and 2 is a medium rpm ship engine, for blocks 3 and 4 it is a high rpm locomotive engine, driving a synchronous generator. They are located with their auxiliary equipment and connected electric equipment in a sealed area chosen from the viewpoint of fire protection; the machines, located in areas side by side, have no common operational auxiliary equipment.

Table 2. Safety Power Supply. Consumers of One System (motor outputs, data in kW)

Start-up Stage	Consumer Designation	Reactor	
		In operation	Being cooled
0	TH 10 high pressure zone cooling	500	--
	TJ 12 low pressure zone cooling	125	--
	Small consumers	45	30
1	VY01 safety cooling water system	500	500
	Auxiliary consumers of make-up water	--	80
2	Make-up water system	--	515
	Intermediate cooling cycles	150	150
3	Hermetic area air cooling	75	75
4	RR30 cooling system	--	160
	Reactor shaft cooling	75	75
5	* RR11 breakdown feed system	200	--
	* RR01 auxiliary breakdown feed sys.	200	--
	Small consumers	--	40
6	TQ 12 hermetic area spraying	160	--
	* Resting basin cooling	55	55
7-8	Small consumers	55	--
9	* Turbine main oil system	75	--

Note: * Item designated only in two systems.

Heated circulating systems keep the machinery warm; fuel oil and lubricating oil and cooling water are always at operational temperatures. The machinery is started with high pressure air; the fuel and lubricating oil pumps needed during start-up are DC. The machinery's own storage battery provides the necessary direct current. The AC auxiliary plant for the machinery has two feeds, from the machinery and from the network. The machinery is connected to

the appropriate 6 kV safety bus.

The 6 kV safety distributers are connected, by system, through circuit breakers to the appropriate operating buses of the auxiliary plant. They operate in one collecting bus connection; the diesel power source supplies safety reserve power to the technological consumers. The 0.4 kV consumers are supplied through a transformer while the distributer for consumers requiring an uninterrupted supply is separated from this by a fast thyristor circuit breaker and can be fed from a motor generator as well. The DC distributer for uninterrupted consumers and the storage battery set are connected to the DC side of the motor generator.

The motor generator group is made up of a four pole synchronous machine and a direct current machine. They are excited by a thyristor excitation regulator fed from the DC side. The regulators of the group keep the current of the DC side (battery charger) in AC motor operation and the rpm and alternating voltage during DC motor operation at constant values.

In normal operation the 6 kV safety distributer is connected to the auxiliary plant feed sources through a circuit breaker. The thyristor circuit breaker is closed, fed from the uninterrupted distributer the motor generator charges the storage battery. With the onset of a breakdown condition the 6 kV circuit breaker and the thyristor circuit breaker disconnect, the motor generator supplies the uninterrupted consumers driven from the DC side and the other consumers are supplied by the diesel generator which has started up.

Above the three safety uninterrupted systems there is a fourth, with similar equipment, which supplies power for the measurements, protection and operation of the technological equipment independent of the block.

The distributers, equipment and linking cable network of the safety electric power supply are separated. The distributers and equipment are located in different areas, by system; the cables of the several systems proceed by a route separate from the other system, isolated from outside cables. Thus fire and outside effects damage only one safety system.

The electric devices and transmitters for measurement, indication and protection must be protected from harmful pressure and temperature arising in the hermetic area in the course of a breakdown so that signals can be generated correctly. So, in accordance with the three safety systems, these devices are located in separate, independently sealed (hermetic) areas, so they cannot be damaged as a result of the breakdown.

The automatic devices operating the safety power supply are also started up in the event of a lasting failure of the auxiliary plant power supply voltage (if switching to the network reserve power source was unsuccessful), in addition to being started up by technological signals. As they are started up the armatures built into the pipelines leading through the boundary of the hermetic area, and kept open by high pressure air, are closed and thus the area becomes tight. The diesel group starts up and within 35 seconds it is ready to take up the load with a generator under voltage at full rpm. The consumers are switched in by stages at 10-15 second intervals depending on

motor sizes; taking up the full load is completed 3 minutes after the failure signal is given. The order of the stages is given in Table 2. The fuel reserve for the diesel group makes possible more than one week's operation at full load.

A Few Closing Thoughts

The share of nuclear power plants in the production of electric power in the developed countries of the world is increasing, because there is today no other realistic, economical alternative to fossil fuels in satisfying the growing needs. This can also be seen from the fact that governments in many countries are planning to build nuclear power plants. The great majority of the new installations are the pressurized water type.

The experience of the some 30 years existence of public nuclear power plants shows that nuclear equipment is being built to satisfy ever stricter environmental safety requirements. Within the framework of this it is of very great significance that, on the basis of experiences with breakdowns, they are supplementing the equipment of nuclear power plants being established and of those already in operation.

Public opinion evaluates nuclear power plants in terms of the actual or felt environmental damage of breakdowns; they get a good bit more information about this than about their role in energy production (a role which is already indispensable). Thanks to the information media of the world we are witness to how daily politics can manipulate this with deliberate inferences, because, citing the environmentally harmful effects of breakdowns, they attack the correctness of the government programs to build nuclear power plants.

All of us who deal with the creation and operation of nuclear power plants have a very great responsibility to see that our equipment operates reliably, to protect our own narrower and wider environment. Thus we prove that this new technology is a useful helper of our society. So we have an obligation to analyze the hypothesized breakdowns and catastrophic possibilities and to learn from the actual breakdowns and, by spreading the experiences, to prepare all nuclear power plants to avert them.

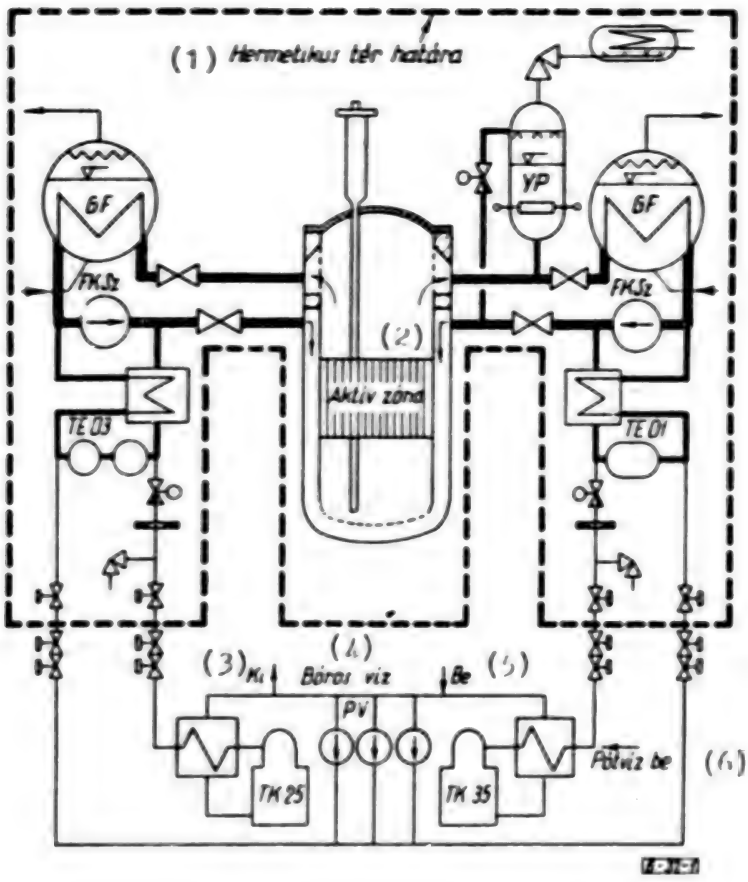

Figure 1. Reactor Main Water Cycle (showing loop 2)

Key:

1. Boundary of hermetic area
2. Active zone
3. Out
4. Boron water
5. In
6. Make-up water in

FKSZ--main circulating pump
GF--steam generator
PV--make-up water pump
TE 01, 03--high pressure water purification system
TK 25--boron control degasser
TK 35--make-up water degasser
YP--volume equalization system

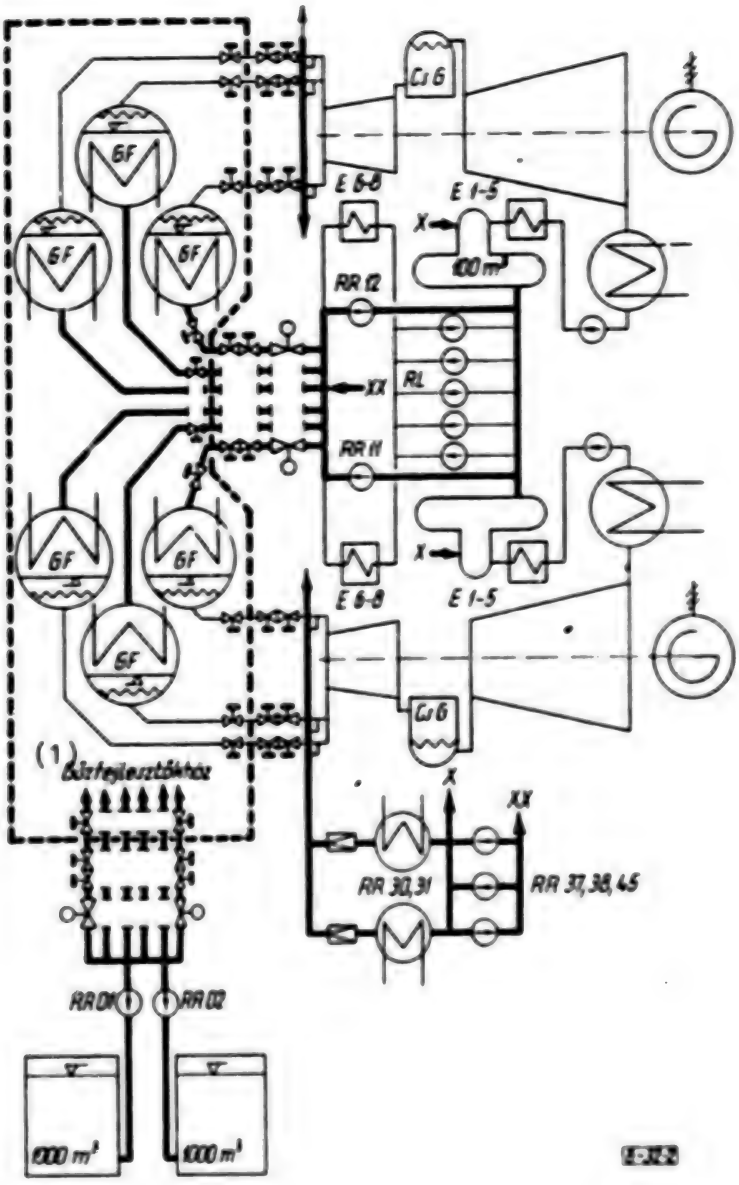

Figure 2. Secondary Cycle Breakdown Handling Systems

Key:

1. To steam generators

CSG--precipitate deposit steam super heater
E 1-5, E 6-8--low and high pressure prewarmers
GF--steam generator
RL--feed pump
RR 01, 02--auxiliary breakdown feed pump
RR 11, 12--breakdown feed pump
RR 30, 31--cooling of steam generators
RR 37, 38, 45--cooling pump
X--cooling between 47-4 bar
XX--cooling under 4 bar

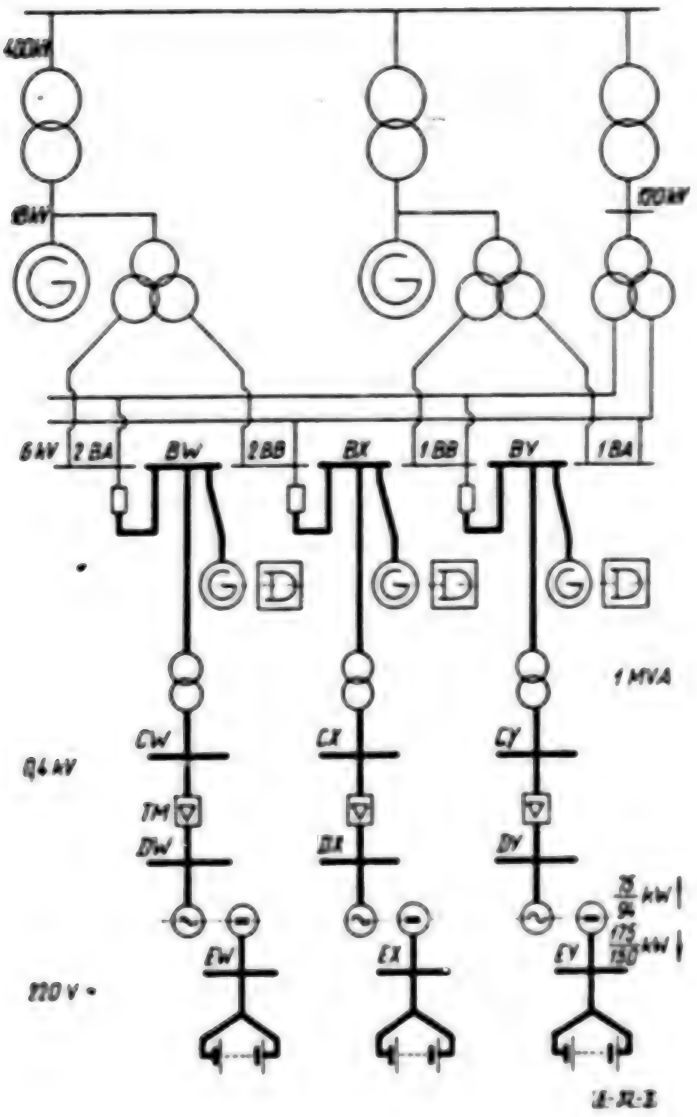

Figure 3. Electrical Connections. Safety Systems of Auxiliary Plant

Key:

BA, RB--6 kV operational main distributer
BY, X, W--6 kV safety main distributer
CY, X, W--0.4 kV safety main distributer
DY, X, W--0.4 kV uninterrupted distributer
EY, X, W--DC safety distributer
TM--thyristor circuit breaker

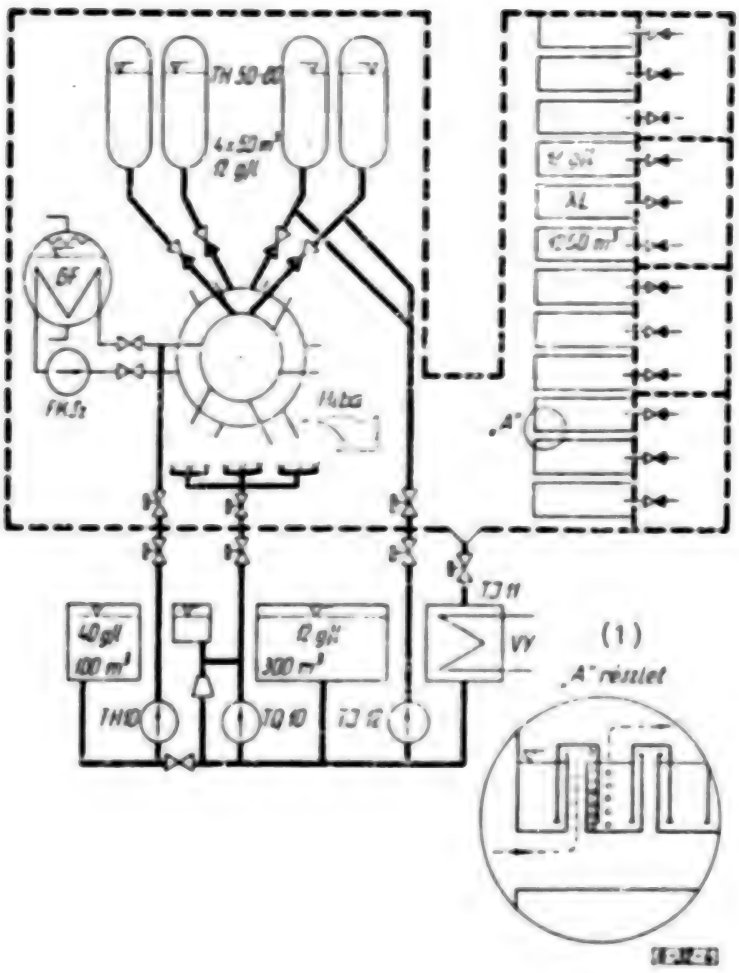

Figure 4. Primary Cycle. Breakdown Handling Systems

Key:

1. Detail "A"

FKSZ--main circulating pump
GF--steam generator
TH 10--zone cooling high pressure system (less than 125 bar)
TH 50-80--zone passive cooling (less than 60 bar)
TJ 11, 12--Sone cooling low pressure system (less than 7 bar)
TQ 10--hermetic area spraying
XL--hermetic area passive pressure reduction
VY--safety cooling water
"Hiba"--"Trouble"

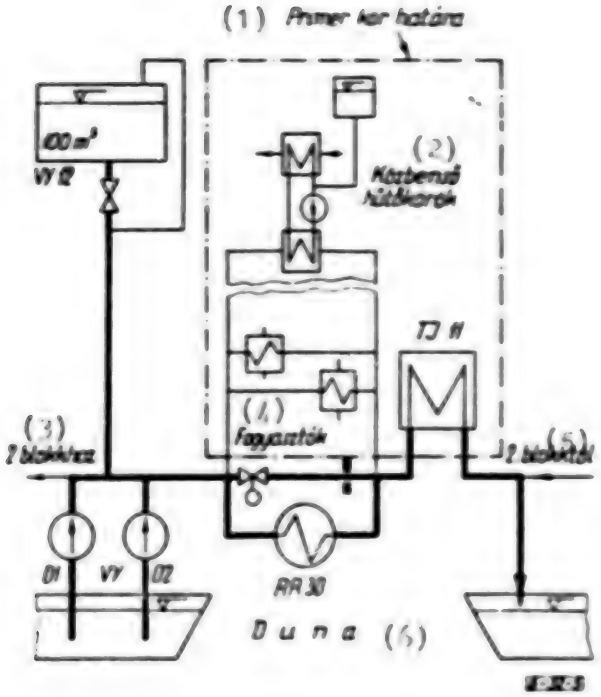

Figure 5. A System for Safety Cooling Water Supply

1. Boundary of primary cycle
2. Intermediate cooling cycles
3. To block 2
4. Consumers
5. From block 2
6. The Danube

RR 30--cooling of steam generators
TJ 11--zone cooling
VY 01, 02--safety cooling water pumps
VY 12--reserve cooling water

8984
CSO: 5100/3002

IAEA PRAISES NUCLEAR PLANT SAFETY

LD071637 Belgrade TANJUG in English 1056 GMT 7 Dec 86

[Text] Zagreb, December 7 ITANJUG)--According to all international technical norms, the Yugoslav nuclear power plant Krsko ranks high up on the list of high quality power stations, said International Atomic Energy Agency (IAEA) nuclear power plants safety (ASSET) commission member Eugene M. Yarmey to the Zagreb daily VJESNIK today.

A mission of six international experts paid two-week working visit to Yugoslavia's sole nuclear 664-megawatt power plant Krsko located in the northwest of the country. As is the custom in cooperation between international agencies with sovereign states, the Yugoslav Government agreed to the visit six months ago.

Krsko began operating in September 1981. In a statement to VJESNIK, ASSET experts stressed that in an analysis covering three years of Krsko's operations--1983, [word indistinct] and 1984, no breakdown of serious dimensions resulting in danger to either employees or the environment had occurred.

Speaking of the safety aspect of nuclear power plants, the experts said that international experience shows that workers in nuclear power stations rarely err when undertaking [word indistinct] which could result in an irregularity in the work of the power station.

ASSET was formed this year and deals with studies of equipment relevant to the safety of nuclear power plants. Krsko is the first station visited by the ASSET mission which will visit nuclear plants in all states which agree to their visit. The visit is yet another form of expert assistance which IAEA offers its member-countries. ASSET, Bernard A. Thomas, a specialist points out, was not founded because of the accident at the Svoiet nuclear power plant in Chernobyl but the incident did result in establishing a reputation for ASSET and in increased interest in the work of the IAEA.

/6662
CSO: 5100/3004

BRAZILIAN DAILY ON ATOMIC SUB PROJECT WITH ARGENTINA

FY151824 Rio de Janeiro JORNAL DO BRASIL in Portuguese 6 Dec 86

[By correspondent Rosental Calmon Alves]

[Text] Buenos Aires — Nuclear cooperation between Argentina and Brazil is becoming so close that it has been admitted the initial negotiations are being held to unify the efforts of the two navies to build nuclear-powered submarines with their own technology. Argentine naval officers believe that no international regulation is being violated because the submarines are not considered weapons but a means of transportation.

Argentina is in a more advanced stage than Brazil, because it is allegedly already building its first atomic-powered submarine in the Domec shipyard. The Buenos Aires press this year has published statements by Navy Commander Ramon Arosa that the first nuclear-powered submarine would be ready in 2 years. Since 1982, when British submarines forced the Argentine Navy to stay in port, secret studies for the construction of a compact propulsion reactor began.

Last August, Brazilian Navy Minister Admiral Henrique Saboia admitted that the Brazilian Navy "is undertaking studies to construct a nuclear submarine." The JORNAL DO BRASIL has reported the construction of a research institute in the state of Sao Paulo especially for this purpose. Minister Saboia said then that no timetable has been set for this project because it was limited by budget problems.

A U.S. Pentagon source told JORNAL DO BRASIL on that occasion that it was already aware of the Brazilian and Argentine efforts to build nuclear submarines, adding that it saw no justification for such a project because it would mean extraordinary expenses. These expenses would only be economically feasible if the submarines were built in large quantities. The construction of just two or three submarines would not justify the investment.

However, an Argentine nuclear sector official said that this is not a matter of war strategy but rather a matter of state-of-the-art technology. Compact reactors are being perfected, and if in one or two decades a nuclear propulsion system becomes economically feasible (since it currently causes deficits and has been discarded from use in cargo ships) only a few countries would have such technology.

The truth, however, is that this is still an uncertain system, as well as a dangerous (as demonstrated by the recent accident suffered by the Soviet nuclear submarine in the North Atlantic Ocean) and extremely expensive one.

This subject is already being discussed unofficially during the contacts between the Argentine and Brazilian naval officers within the current framework of rapprochement of the two armed forces. The subject of nuclear submarines will not be discussed, at least officially, during President Alfonsin's visit on 8 December. However, two protocols that will be signed during his visit will provide an opportunity for the idea to develop.

/9738
CSO: 5200/2053

PAPER CALLS FOR RELEASE OF NUCLEAR AGREEMENT WITH CUBA

Buenos Aires LA PRENSA in Spanish 17 Nov 86 p 6

[Editorial: "Nuclear Agreement with Cuba"]

[Text] Argentina and Cuba have signed a bilateral agreement on the peaceful use of nuclear power in Havana. It calls for the exchange of experiences and information on operations, maintenance and quality control at nuclear power plants, as well as aspects of radiation safeguards and safety. The accord, the first of its kind between the two countries, also covers the use of irradiation for food preservation and technical and scientific information on nuclear power.

The importance of the agreement is obvious from just this brief mention of its features, and hence the complete text ought to be made public so that we are fully aware of the scope of the obligations that it entails. Nonetheless, even though the information that has been released is meager, the delicate nature of the subject matter of the agreement obliges us to express some misgivings and reservations about it.

First, although any accord that furthers the peaceful use of nuclear power is, in principle, praiseworthy, we must not forget that either of the parties can take advantage of it unilaterally (in other words, without the consent of the other party) for military purposes. In this regard, the aggressive, militaristic policy of Castro's Cuba during the past quarter of a century is certainly no reason to rule out such a far from reassuring hypothesis. Thus, a bilateral agreement that would make such a hypothesis feasible, even if its limits have to be overstepped, is completely unadvisable. Although such limits are imposed, as in any contract, so that the parties will observe, not break them, the negotiators should have had the elementary sense of caution to discern the danger of such an eventuality.

Aside from this initial concern that the recently signed treaty prompts, however, we cannot help but remark that it represents a disquieting collaboration with a government whose ideology is diametrically opposed to our country's in a highly strategic industry that is suited to military purposes. No one is opposed to maintaining diplomatic relations and promoting trade with communist nations. Certainly, however, selling wheat or buying sugar is not the same as furnishing atomic energy technologies. Such alarming fraternizing

with regimes that are within the Soviet orbit, fraternizing that our president's recent personal contacts with its most prominent leaders have made to appear reasonable, suggests that our foreign policy is moving in a direction that is at variance with our most genuine historic and institutional tradition.

Our diplomacy is stubbornly focusing on just the so-called "north-south" conflict (in other words, between the have and have-not nations), a conflict that is merely economic and capable of resolution, while it ignores the "East-West" conflict or pretends that it does not exist, when the fact is that this is a much more far-reaching ideological battle between totalitarian communism and liberal democracy that has no foreseeable resolution.

Developments such as the one we are discussing prompt understandable confusion among the public, which cannot grasp why we are seeking to support and cooperate closely with systems that scoff at the lifestyle that we so zealously try to maintain. The government must accordingly clarify the purpose of our international relations and abandon dangerously ambiguous policies, of which the agreement in question is a conspicuous example.

8743
CSO: 5100/2043

CONTROVERSY OVER GASTRE NUCLEAR DUMP PROPOSAL

Buenos Aires SOMOS in Spanish 19 Nov 86 p 38

[Text] Perhaps President Alfonsin's recent comment in Trelew that "a nuclear dump that endangers the health or lives of residents will not be built in Trelew or anywhere else in the republic" was what renewed the controversy.

The decision to seek an appropriate spot to build one (and, hence, the dispute between proponents and opponents ever since the announcement) goes back to 1978. The experts on the National Commission for Atomic Energy (CNEA), together with geologists from the National University of San Juan, have found that of the 200 granite formations they studied all over the nation, the one in the Sierra del Medio, 50 kilometers from Gastre, would be ideal. The CNEA does not like to talk about "nuclear dumps." The term inevitably evokes the image of an unsupervised, contaminated open site. What they plan to build in the midst of the Patagonian tableland (450 kilometers from Trelew and 500 meters below ground) is a nuclear waste disposal. This is a sort of cavern suited for storing the hermetically sealed steel and lead containers that will house the vitrified capsules of spent nuclear fuel, which will remain lethally dangerous in some cases for up to 100,000 years.

The construction of the disposal site in Gastre is not a sure thing. The CNEA experts have just begun the feasibility studies, the conclusions of which are supposed to be ready by 1987. The final decision will be up to the Executive Branch. The budget for this project is estimated at some $300 million.

Some who oppose the construction of the disposal site feel that the decision and choice of the site are premature. According to even highly optimistic forecasts, they say, the country will have at the most four nuclear power plants on line as we move into the 21st century. What this means is that the radioactive waste the country will produce will not have to be stored right away at a final site, inasmuch as it can be kept for up to 50 years in provisional storage tanks (as now) on the surface.

However, Elias Palacios, an engineer who is the CNEA's radiation safeguards and safety manager and the director of the studies on the selection of the Argentine disposal site, reasons as follows: "The production of radioactive waste is a fact of life in the nuclear power industry. So if Argentina does not want to have waste around, it just has to stop producing nuclear energy."

Palacios admits that there is no urgent need to build the site. "But there is, however, an ethical imperative. We cannot allow this generation, which is enjoying the benefits of electricity generated by Atucha or Embalse, to foist the waste problem off on future generations to resolve."

Hence, Palacios contends, the Gastre project must proceed at a steady but not necessarily ambitious pace. "We're thinking that the project ought to be on line by 2005 or 2010." And he described as ill-intentioned any report that Argentina might rent its site to other countries so that they could bury their wastes there. "That is a political decision that I don't think any government would dare make," he asserted.

Oddly enough, not all environmentalists, who are dead set against nuclear power, denounce the construction of dump sites. A few days ago, the provincial network of Nongovernmental Environmental Organizations of Cordoba Province met in La Cumbre and reached the conclusion that "the CNEA's budget should be allocated exclusively for the maintenance and security of existing facilities until they are completely dismantled." And while they are categorically opposed to the construction of the Gastre site, "a project that has been undertaken without any sort of prior consultation with the people" (sic), they feel that "the only area in which the CNEA ought to be unstinting in its funding and studies is the construction of a disposal site for the nuclear waste that already exists in the country." As if there were not enough opinions already being voiced, the international environmental organization Greenpeace is setting up shop in the country at the moment. What side will it take on the issue of the nuclear dump site?

8743
CSO: 5100/2043

BRIEFS

CASTRO MADERO RESIGNS--(NA-DYN)--The government yesterday accepted the resignation of National Appeals Court Judge Guillermo Ledesma and retired Vice Admiral Carlos Castro Madero, who has been working as advisor to the National Atomic Energy Commission. Ledesma was head of the court which recently sentenced former provincial police chief Ramon Camps to 25 years imprisonment. The judge recently disagreed with the government's decision to send the "full stop" bill to Congress. He was also irked when the Supreme Court withdrew first Army corps dossiers which include the names of five generals Ledesma's court intended to prosecute. Vice Admiral Castro Madero was head of the National Atomic Energy Commission (CNEA) during the entire former military government. He masterminded plans to construct further atomic energy and heavy water plants and atomic submarines. Castro Madero has been away from Argentina for several months and is now in Geneva acting as advisor to the International Atomic Energy Organization. [Text] [Buenos Aires BUENOS AIRES HERALD in English 20 Dec 86 p 11] /9604

CSO: 5100/2055

NUCLEAR ATTACK SUBMARINE PLANNED FOR 2010

PY261752 Rio de Janeiro O GLOBO in Portuguese 25 Nov 86 p 8

[Text] Brasilia--The first nuclear-powered Brazilian ship will be an attack submarine that will begin operating in 2010. According to Navy Ministry sources, any reports on this issue before 2010 will be speculation.

According to the sources, the program is divided into three phases: Construction of a pressurized hull, construction of a compact nuclear reactor, and the construction of the transmission using materials that make little noise.

/12232
CSO: 5100/2051

CNEN CHAIRMAN: A-BOMB TECHNOLOGY AVAILABLE

Nazare Alves Releases Report

PY172215 Madrid EFE in Spanish 1417 GMT 17 Dec 86

[Text] Rio de Janeiro, 17 Dec (EFE) — Rex Nazare Alves, president of the National Commission for Nuclear Energy [CNEN], has reported that Brazil already has the necessary nuclear and uranium production technologies to build the atomic bomb.

Nazare Alves said that this is the most important step that Brazilian experts have taken in the development of a parallel nuclear program.

Mastering the technology for reprocessing fuel that has been used in nuclear plants is as important for a country as the enrichment process, Nazare Alves stated. He added that the reprocessing of used fuel allows the production of several products, including plutonium, which can be used to manufacture atomic bombs.

The CNEN president explained that Brazil has begin to develop nuclear technology for strictly peaceful purposes. He added that CNEN installations in Serra do Cachimbo, Para State, will not be used for nuclear tests, as reported by some news media. The parallel nuclear program began in Brazil in 1979 with the development of the technology for the production of Uranium hexafluoride.

According to the report released by Nazare Alves, the Brazilian Government has ordered the use of nuclear energy in short-term social impact areas such as the production of radioisotopes for use strictly in the medical and industrial sectors, the irradiation of foodstuffs, and the production of fertilizers.

He said that in February 1987 Brazil and Argentina will begin a project to build a type of "fast-breeder" reactor, as provided for in the joint declaration on nuclear policy signed by the presidents of Brazil and Argentina. This project will be developed by the nuclear energy commissions of Brazil and Argentina, along with projects on nuclear safety, production of fuel elements for research reactors, and the development of complementary programs to detect radiation. Nazare Alves stated that the fast-breeder reactor, with an output of less that 100 megawatts, will reach full power in about 25 years and will use enriched uranium and plutonium as fuel.

Further on Nuclear Issues

PY181420 Sao Paulo FOLHA DE SAO PAULO in Portuguese 17 Dec 86 p A 4

[Text] Rio de Janeiro — During a press conference at the CNEN [National Commission for Nuclear Energy] headquarters in southern Botafogo district, CNEN chairman Rex Nazare, 48, said yesterday that the CNEN coordinates "all the nuclear activities of the Armed Forces" and that the military "would not be able to make an Atomic bomb without the CNEN." Rex Nazare said that there is "still" no project to build a nuclear submarine, but that "we are headed in that direction, and it may take from 5 to 10 years." He added that "there are no doubts that this development will lead us toward the knowledge of nuclear propulsion" and that he is making "an assessment to check on the current status of that project and its prospects."

According to the CNEN chairman, "there was no military interference in the agreements on nuclear issues signed by President Jose Sarney and Argentine President Raul Alfonsin." He then said, however, that "there is a sort of boycott or prohibition to act in the nuclear field." Rex Nazare added that the CNEN is "conducting an independent project to master the fuel cycle for research reactors and make this technology available for small-size reactors." According to the CNEN chairman, "the CNEN, the technical departments of the Armed Forces, the national private business companies (he did not reveal the names of the business companies involved), and the Brazilian universities" are participating in this project. Nazare added that the first step in mastering the nuclear fuel cycle "was taken in 1979 when the independent production of uranium hexafluoride was authorized in Brazil," a program that "President Sarney has decided to continue." According to Rex Nazare, President Sarney "plans to substitute national technology for by-product imports in the nuclear field, saving from $200 to $300 million per year."

The CNEN chairman said that there is "a long-term feasibility survey for jointly buiding with Argentina a prototype of a fast-breeder reactor, capable of generating second-generation fuel, equivalent to the quantity of fuel that it consumes." According to Nazare, "at the same time that it produces uranium 235 or Uranium 233 or even plutonium, the reactor produces another quantity of plutonium for a new recharge." According the CNEN chairman, "Argentina possesses the processing technology and is testing fuels containing plutonium." Rex Nazare asserted that there are no risks for the people who have consumed radioactive imported milk, and that within 3 days the CNEN will release a complete survey on the milk consumed in Sao Paulo. He said that the 1986 CNEN budget totaled nearly 530 million cruzados.

/9604
CSO: 5100/2054

MILITARY MINISTERS DISCUSS NUCLEAR PROGRAM

PY191535 Rio de Janeiro O GLOBO in Portuguese 17 Dec 86 p 20

[Text] Brazil has already mastered the complete fuel cycle for the production of highly enriched uranium, as well as the technology to manufacture atomic bombs. However it feels that possessing such a weapon would constitute an unacceptable political responsibility that would bring no benefit for the country.

That is the position of the military ministers regarding manufacturing a Brazilian atomic bomb, and it has repeatedly been stated in exclusive and collective press interviews. The only strictly military nuclear program is aimed at manufacturing a compact nuclear reactor for a nuclear submarine that will be operational in 2010.

Meanwhile, the Armed Forces, through the research centers of the Army, the Navy, and the Air Force, are developing a nuclear program that is technologically more advanced than the program developed under the agreement with the FRG which was made early in the Geisel government. The Armed Forces program has the advantage of being paid for in cruzados, not in dollars or deutsche marks, therefore, it does not constitue a burden for the country's trade balance.

According to military sources, the Parallel Nuclear Program is older than the civilian nuclear program. The Parallel Program was stated in 1974, nearly 2 years before the nuclear agreement signed with the FRG. Since its objectives were more ambitious, its execution was to take a longer period of time, the Parallel Program opted for an alternative technology, should the available technology fail.

The only technology available for uranium enrichment was the "jet nozzle" method, and this method consumed more energy than the final product, the enriched uranium, would produce when placed in a traditional (fission) reactor. On the other hand, the package signed by Geisel would transfer important industrial technology in the area of equipment for nuclear plants. That technology would serve not only to manufacture equipment for nuclear plants -- such as that for continuous welding -- but also for the naval industry and heavy precision mechanical work.

Meanwhile, the technological centers of the three branches of the Armed Forces concentrated their efforts on developing more economic and effective methods for uranium enrichment than the Urenco [international consortium] method. In theory, those centers were also working on the technology for "fast breeder" and fusion reactors.

The fast breeder reactors are fueled with enriched uranium, together with plutonium, which constitutes most of the atomic waste; they can generate more energy than they consume, continuing to operate almost indefinitely. The fusion reactors are technologically more advanced, they are like tamed hydrogen bombs, operating at temperatures of up to 2,000 degrees centigrade.

By opting for such advanced research, the Armed Forces accepted a great risk of failure. Brazil did not have plutonium available at that time. All the plutonium generated in university reactors, such as the Argonauta (the first Brazilian atomic reactor) were under the control of the International Nuclear Energy Agency.

Before they set out to build fast breeder reactors, the Army and the Air Force tested, in two 320-meter deep furnaces, a method to transform uranium experimentally enriched at the Air Space Technical Center of Sao Jose dos Campos (Sao Paulo state) into plutonium.

The site for the experiments was the Serra do Cachimbo Testing Ground, in Southern Para state. The few grams of plutonium obtained in this fashion demonstrated the feasibility of the method developed at the Air Space Technical Center (CTA), opening the way for the second phase of the program, that of designing a fast breeder reactor.

At present, the fast breeder reactor technology is being developed at the Army Technological Center, the CTA, and at Fundao Island. These programs, as the theoretical studies for building a fusion reactor, are strictly for civilian use, and have no chance of being used for military purposes.

The work on uranium enrichment being conducted by the Navy and the Air Force is aimed at two other projects. One of them is the construction of a nuclear submarine in the first decade of the 21st century. The other project is intended to produce fuel for meteorological satellites manufactured in Brazil, and scheduled for launching around 1990.

Paradoxically, the Air Force is leading in this field, although it needs only a few grams of enriched uranium to power its satellites. Using 20 ultracentrifuge units that rotate at 2,500 turns per minute, the CTA has already obtained commercial quantities of uranium enriched more than 90 percent.

These ultracentrifuges were acquired from the FRG in the mid-1950's, and were ironically dubbed "chocolate mixers." The FRG did not believe in the viability of this method, and opted for enriching uranium by "gaseous diffusion," a method developed in the United States.

According to a highly placed source in the intelligence community, the "chocolate mixers" were abandoned for more than 10 years, up to 1968, in a warehouse of the National Nuclear Energy Commission, until the CTA became interested in "that nonserviceable junk." These units were practically rebuilt, including in them some imporvements that are secret.

Following a line of pure research, the Navy works on the enrichment of uranium using lasers. Theoretically, this method can yield uranium that is 90-percent pure, with a minimum consumption of energy. Up until now, however, the Navy has not had very positive results. The degree of enrichment obtained so far is only 10 percent.

/9604
CSO: 5100/2054

NUCLEBRAS CHIEF DISCUSSES IAEA SUPERVISION

PY202007 Sao Paulo FOLHA DE SAO PAULO 19 Dec 86 p A4

[Text] Yesterday in Rio de Janeiro Licinio Seabra, president of Nuclebras (Brazilian Nuclear Corporation, Inc), said that Nuclebras and CNEN (National Commission for Nuclear Energy) are not unified. CNEN is therefore not subject to the safeguards imposed on Nuclebras by the International Atomic Energy Agency (IAEA) when Nuclebras signed a nuclear cooperation agreement with the FRG in 1975. According to Seabra, "the IAEA does not have control over the CNEN and cannot inspect it, but it can inspect Nuclebras at any time."

Seabra made this comment yesterday at a press conference at Nuclebras headquarters (in the center of Rio de Janeiro), 2 days after CNEN President Rex Nazare said that Brazil has already mastered uranium-reprocessing technology, which leads to the production of plutonium, the essential element for the production of the atomic bomb. This technology was developed by CNEN under the parallel nuclear program, which is separate from the nuclear program signed with the FRG.

According to Seabra, the IAEA makes sure that Nuclebras does not use technology obtained as the result of the agreement for nuclear weapons. On the other hand, as Brazil is not a signatory of the nuclear nonproliferation treaty, the other nuclear activities of the country, such as those developed by the CNEN and by the military research institutes, are not subject to IAEA regulations.

The Nuclebras president, who yesterday assessed the achievements of the corporation in 1986, also said that development of research at the Institute for Nuclear and Energy Research (part of CNEN) for the production of uranium exafluoride gas will allow Brazil to terminate its contract with the French firm Pechinet for the transfer of technology to convert enriched uranium hexafluoride for nuclear use. According to Licinio Seabra, nearly $4 million was spent on this program, "But you cannot talk in terms of money lost, because had we continued to purchase abroad, we would have spent much more than what it cost to make the technology available nationally."

Seabra also said that the part of the agreement with the FRG on the transfer of uranium-reprocessing technology could be revised, if by 1990 (when a renegotiation of the agreement is scheduled) the CNEN has mastered this technology. He admitted he did not know how far it has developed. "I do not know to what extent the CNEN has progressed in this respect, but if Rex Nazar says they have already mastered this technology, I think it is good and I trust him," he added. Seabra said, however, that the technology for the manufacture of enriched uranium cakes must continue to come from the FRG, because the CNEN, I believe, "is still in the beginning stageof" this technology.

The uranium enrichment process is another item that could be renegotiated, if by 1990 the CNEN develops the technological know-how. However, the president of Nuclebras ruled out the use of national technology for the construction of nuclear power plants, at least until the fourth plant provided for by the FRG-Brazil agreement is finished, even though its construction has not yet been approved by the Brazilian Government. According to Seabra, only then will Brazil have complete mastery of the technology to build nuclear power plants. If the fourth power plant is not built, Seabra says, all the technology we have already acquired will be in vain.

/9604
CSO: 5100/2054

ANGRA I VIEWED AS EXAMPLE OF MANAGERIAL INCOMPETENCE, MISSPENDING

Rio de Janeiro MANCHETE in Portuguese 5 Nov 86 pp 104-110

[Text] Lying in a splendid cradle on a beach of Angra dos Reis, halfway between Rio de Janeiro and Sao Paulo, sleeps an elephant which the Brazilians have not been able to figure out. The body of that animal, baptized "Angra I," made of concrete and steel and powered by an atomic pile, initiated its birth in 1971, but up to now no one is capable of saying that is really alive. Angra I is a whimsical animal. When it is thought that it has gone to sleep, it is discovered through an announcement by government authorities that it is going to operate anew. When it is imagined that Angra I is well-disposed, in full operation, someone sounds the alarm and puts the sphinx to sleep once more.

It is generally feared that nuclear power plants will cause ecological disasters. Angra I, with its failure, is the symbol of a disaster of administration and of the regime that conceived supposedly clearsighted authoritarian solutions that with time revealed themselves to be complete nonsense. The Angra I power plant that Brazil purchased from the American company, Westinghouse, during the government of Gen Garrastazu Medici, has already broken down 22 times, not counting in that number the possible breakdowns that may not have become public knowledge. The plant was supposed to have been ready in 1977, but was just inaugurated in 1983, 12 years after work on it began. It was to have cost $300 million and it has already cost six times more than that. Because of its nature, it was to produce electric power. It does not. Because of the risk potential involved in an undertaking of its type, it needed to be safe. It is not. Last week, two technicians hurriedly brought from the United States, tried to discover the source of the 22nd breakdown in Angra I--a malfunction that involved an emergency diesel generator, caught at least two other times on the verge of breakdown. The 21st problem took place only 3 weeks before, when the water that cools the radiocactive uranium rods of the plants, which means radioactive water, leaked into a holding tank because of a defect in a valve. Whenever it is affected by some mishap, Angra I is shut down, but its equipment breaks down with such frequency that in the last 3 years since its inauguration--illuminated by fireworks--it has operated for a total of less than 3 months.

The Will of God

"The plant cannot have defects when it goes into operation and that is the reason for the tests," said Minister of Mines and Energy Aureliano Chavez, who has the difficult task of carrying the pachyderm. With his interpretation of test periods, Aureliano consecrated the longest testing phase ever recorded in a nuclear power plant. "I am fed up with the dimensions that is given to the word 'leak,'" said former Minister of Industry and Commerce Joao Camilo Penna, today president of Furnas Electric Power Plants, the state company responsible for the construction and operation of the plant. "That allows the interpretation that there was a release of radioactivity into the environment, something that did not happen." As at other times, Camilo Penna promised to restart the plant as soon as possible, at a date to be decided upon in heaven. "The future belongs to God," he said last week, "and Angra will return to operation when God wills." Until God's will is done, it will be up to the tax payer to pay the bill.

The Angra I nuclear power plant may be regarded as an exceptional undertaking, even in the vast universe of nuclear-powered plants, among which it broke memorable records. There is no report of a nuclear power plant, among the 375 scattered throughout the world, that has burned up so much money as its principal fuel and has failed to meet deadlines in such a brazen manner as Angra I. FURNAS owes such a pile of money, as a result of loans acquired abroad for paying for the first nuclear power plant in the country, that in interest alone it spends more than $1 million per day. And all that is taken from the public coffers to support a kilowatt factory that does not produce, and like the fireflies, it turns on and off without lighting up anything. To have an idea of what that drain means, a half million dollars would be enough for supplying a capital the size of Belo Horizonte or Porto Alegre with meat.

Simple Case

Angra I can be described as the most perfect example of the waste of public resources and managerial incompetence among the many cases exhibited in the country. In the 50's and 60's President Juscelino Kubitschek was incesstantly criticized for building a capital in the hinterlands; Brasilia, however, with its basic nucleus in operation and Janio Quadros in the presidency, did not cost more than an Angra I. The Trans-Amazon Highway, another target of criticism in that area, was 15 times cheaper than the Angra dos Reis power plant. The difference is that Brasilia is operating at full power and is becoming a self-supporting city, as its designer foresaw, and the Trans-Amazon Highway remains in activity 365 days a year. The Trans-Amazon, moreover, no longer bothers the ecologists, who have forgotten it in order to concentrate on more alarming objectives, such as Angra I itself. It was only after the explosion in the Soviet power plant at Chernobyl that those responsible for managing the Brazilian power plant remembered to draft an evacuation plan for the people who live in the surrounding area, in case of accident. That plan in itself would win another gold medal for Angra I in the competition with power plants in other countries. It was stipulated, for example, that CMTC buses from Rio de Janeiro, 130 kilometers away, would be involved in a possible rescue operation. Ecologists, horrified, could not

have had better grist for their mill. Last week a group bore an antinuclear banner on the sands of Ipanema Beach. A useless protest. A shut down power plant can never explode.

What is frightening in the case of Angra I is its extreme simplicity. A very poor business was entered into, primarily because of the contract for the purchase of the plant; it is one of those contracts that is very good for the seller and bad for the buyer. "Because of the time I spent in ELETROBRAS, [Brazilian Electric Power Companies, Inc.], I consider Westinghouse to be exclusively responsible for existing problems," says Minister of Communications Antonio Carlos Magalhaes, who headed the company during the Geisel Administration and is a man who is not accustomed to looking to the heavens for the reasons for the good or bad performance of any industrial installation. "In addition to have presented a contract disadvantageous for Brazil, more than once Westinghouse asked for postponements in operational dates from various administrations, and up to now it has not gone into operation," says Antonio Carlos. Postponement can be translated into more money and more time.

Change of Chairs

In every good business, however, there is always an expert and a blockhead, and the latter must be sought in Brazil among the officials who in some way were involved in the discussion of the contract or in its renegotiations. Around the problem of Angra I, strangely enough, there is a ring of names, always the same--who for a long time switched chairs among themselves: We begin with engineer Mario Bhering, who headed ELETROBRAS in the Medici Government, when the Westinghouse contract was signed to his applause and with his participation; today he is once more in the same chair as an unexpected critic of Angra I; Camilo Penna, former minister of industry and commerce and today the president of FURNAS, where Bhering has already operated also; while Aureliano Chaves, now the minister of mines and energy and an enthusiastic supporter of the Brazilian Nuclear Program, occupied the presidency of the Chamber of Deputies Energy Commission and headed the Energy Commission of the Figueiredo Government; Cesar Cals, former minister of mines and energy, prior to that passed through ELETROBRAS; while Licinio Seabra, who headed FURNAS, is today at the head of NUCLEBRAS.

Among those who participated in the negotiations for the power plant, Mario Bhering is one of those who acknowledges the harm. "Brazil is going after damages and is arguing greatly with Westinghouse," says Bhering. "It was mainly responsible for the delays in the power plant and it did not pay a fine for the delay," he says. It did not pay any fine simply because the contract did not foresee that possibility, in the same manner that it does not contain guarantees that the equipment sold is going to function correctly, a guarantee that is present in some of the simplest things such as automobiles or washing machines. "The question about the contract should be explained by the Brazilians," declared Robert Henderson, a Westinghouse spokesman in the United States, very appropriately.

"No One Knew"

Witnesses of the negotiations between the Americans and Brazilian officials for the purchase of the plant relate that the sellers, well prepared and experienced, demanded everything, while the buyers, eager candidates to the atomic club waiting room, gave in unceasingly with a surprising lack of an idea as to what it was they were signing. "Those large foreign companies are very competent when it comes to making good contracts for themselves," says physicist Jose Goldemberg, former president of the Sao Paulo Electric Powerplants, Inc. (CESP), itself a large company, who is now the rector of the University of Sao Paulo. "The officials who contracted for Angra were inexperienced in the matter, and not too many people read the contents of contracts with the necessary attention," adds Goldemberg. With grace, the Sao Paulo physicist raises the other end of the veil: "In addition to not knowing what they were buying, the negotiators did not know how they were buying.

Ignorance about the article ordered is as frightening as is its admission. "I believe that no one knew at that time that this type of power plant was obsolete," explains Bhering. He placed himself in the position of negotiator with several other Brazilian technicians, apparently sure of what he was doing. Today, he is the first to cancel the credentials of those who handled the deal with the men of Westinghouse, but he faces the failure with the naturalness of one who is lamenting the purchase of the wrong television set. The present lamentations of Bhering contrast vividly with his optimism in 1970, when sitting in the same chair as president of ELETROBRAS, he hailed the nuclear power plant still to be built. "It will be a plant of a proven type and of assured reliability, obsolete reactors are not being considered in the bidding," he declared at that time.

Emergency Situations

A third element that goes to make up the Angra I disaster, in addition to the disadvantageous terms of the contract and the error in the choice of an obsolete model of a plant, is the fragility or the inadaptation of its parts for withstanding the requirements of a nuclear power plant. In Angra I, as in some similar power plants (See chart on p 107), almost everything has already broken down, with the exception of the heart of the reactor itself: The enriched uranium rods. The plant's steam generator has already broken down, the axle of the turbine became untrue, the tubes of the condenser of that same turbine showed signs of corrosion, and so forth up until the occurence of the two defects of recent weeks. The malfunction, which 10 days ago involved the diesel electric generator, concerned a part already found broken down in no fewer than two previous occasions.

That generator exists for emergency situations, when the supply of electricity to the machines of the power plant is interrupted by some problem in the conventional network. In that case, the task of maintaining the cooling system of the radioactive uranium rods of the power plant in operation is transferred to that generator. To allow a nuclear power plant to operate

with a failure in the electric network and the emergency generator at the same time is the equivalent of driving a car without brakes. During the preventive maintenance of the diesel generator filters, plant technicians discovered that metal particles had been collected by the equipment, an abnormal occurrence. If there were particles, they necessarily had to have come from someplace and that point was in danger. "It is an indication of the degradation of material," explains Pedro Figueiredo, the power plant chief.

The filings collected were sent for examination in the United States, where an attempt would be made to discover the part from which they came. "We still do not know," says Pedro Figueiredo, who considers the incident nearly commonplace. According to the first indications, examinations may indicate that there was one of these problems: Deficient lubrication, overloading of equipment, material fatigue, or faulty manufacturing. The leakage of radioactive water that happened a month ago is also a repetition in that area: This is the tenth leak in the past 7 years. "It is impossible to have zero leaks," explains Figueiredo, an official who speaks a dialect of current use in Angra I. "The leak was only an unusual event," he declares.

There has already been a large fire in Angra and even the floor had bad luck. In those cases, however, there can be no talk of faults in the material. In those two cases, people failed. In the first case, a fire of crimin l origins is suspected, set deliberately to burn stocks and evidence of misuse of money. "They bought too much or too little and they tried to prevent the discovery of that fact," accuses a high executive of one of the Angra I suppliers. The mishap with the floor resulted from the construction of the other power plant, Angra II, quite close to Angra I. Because of that interference, the ground gave way and one of the machinery buildings of Angra I heeled over like a ship before sinking.

Laborers' Fault

In no fewer than four reports prepared in FURNAS, another guilty party is found for the ills of the plant: The unskilled manpower used in the construction of the nuclear power plant. Thus, the hunt for those responsible for the disaster of the power plant has reached perfection. On one hand is God, with his capability of interfering in the daily operation of the reactor. On the other, the humble laborer who knocked on the door of FURNAS asking for a job at the Angra work site. As always in such situations, guilty parties who cannot be reached are created, while those personages with names and surnames--and with visible activities in each of the blunders of the plant, are not even bothered with a request for explanations. A contract was signed for the purchase of costly and complicated equipment and no formal guarantees were required from the seller. An obsolete power plant was acquired and with it a multitude of parts with an indescribable capacity for breakdowns. Money was thrown out the window with frightening ease and all that is viewed as if it were the product of some fatality. "Conditions of the time did not allow the visualization of a more ambitious program, and Angra I was an initial step required for Brazil to enter nuclear technology,"

defends Licinio Seabra, the president of NUCLEBRAS, who has also headed FURNAS Electric Power Plants. In short, perfection was exceeded. After blaming God and the laborers, responsibility is cas on the era.

Brazil today is forced to pack away the dream of Angra I because the military regime allowed itself to be deluded by the dream of the nuclear program. For the plan of a peaceful Brazil, the military created repression, which slid into torture and the creation of the DOI-CODI [Department of Domestic Operations-Internal Defense Operations Center]. For the plan of a greater Brazil, they began with the nuclear dream and, hidden within it, the idea of obtaining the bomb. How is an atomic bomb made? The most practical way is to install a nuclear power plant and a supplier of fuel for it. The nuclear power plant is only a marvelous machine for making the heat used for turning turbines that produce electricity, a mechanism that would be as simple as a locomotive boiler, except that instead of wood it would use enriched uranium. The uranium burned in a power plant, however, can be reused, provided it goes through a reprocessing center. It is there that a possible atomic bomb begins to be formed. The ashes of a reactor also contain much uranium and a little plutonium, the raw material used for the manufacture of atomic weapons.

During the Figueiredo Government, interest in the bomb was made clear, even in some meetings at 0900 at Planalto Palace, those which the president had daily with his closest advisers, the so-called household ministers. In those meetings it was decided to exempt imports of parts for a fuel reprocessing plant, and an offer for enriched fuel made by China was examined. Years before, Cyrus Vance, secretary of state of the American Government, went as far as to offer Brazil a reprocessing plant to be shared with Argentine in Brazilian territory. The idea of the Americans was to encourage that undertaking, which because of its binational nature would be more easily exposed to international oversight. Argentina accepted the idea. Brazil with an eye on the experience of Israel, which made the bomb on the basis of plutonium taken from a common power plant, rejected Vance's offer.

Adequate Parameter

Compared with other power plants, Angra I reveals itself as an almost incomprehensible fiasco. The hydroelectric plant of Itumbiara on the border between Minas Gerais and Goias, began construction in the same era as it did and was finished in only four and one-half years, cost two and one-half times less and produces 2.1 million kilowatts--three times more than the nuclear power plant should produce with a load of 51 tons of uranium. Move the parameter to something more suitable, another nuclear power plant, and the different persists. In West Germany there is what could be called a "plant of reference" for future Brazilian nuclear power plants: Angra II and Angra III, under construction at the side of Angra I. It is the Grafenrheinfeld power plant, installed in the southern part of the country and very similar to the ones Germany sold Brazil through the accord the two countries signed in 1975. Inaugurated in 1983, the year when Angra I was turned on, that power plant stopped only once and only for 1 day of the year.

Angra I is the only visible face of the commercial use of the atom in the country and that face is a bitter one. It cannot be said with assurance that one day it is going to operate fully and in that case supply 1 percent of the energy needs of the country, as its potential allows. It will be little compared to what it cost, but even so it will be worthwhile putting into operation at once. "Since we have arrived at that point, it is better to have it producing than stopped," says physicist Jose Zatz of the Agency for the Application of Energy of the state of Sao Paulo and a critic of nuclear power plants.

"However, that is providing that an inspection for compliance with safety standards is made by people who do not work in any of the entities that control and operate the plant," declares the physicist. Zatz is another of those who does not trust the persons responsible for the existence and operation of the pachyderm.

Freezing

The still invisible face of commercial use of the atom is embroiled in the accord with West Germany through which Brazil ordered another eight plants that would be ready by 1990. Of different design than Angra I, those plants were cancelled one after the other after the Figueiredo Government became aware that the country, at that time sliding into a serious economic crisis, did not have the money to pay for the order nor the need for all the electric power that the nine power plants would produce. The plan was then limited to the beginning of the work of Angra II and III. The remaining power plants were frozen to paper and they will remain there for an undetermined period.

"The government intends to finish Angra II, which is almost ready, but it has not yet made a decision with respect to Angra III," asserts Henri Philippe Reichstull, secretary general of the Secretariat of Planning. In the first case, there is practically no way to disagree with the decision. The government has already spent more than $2 billion on the plant, which has 75 percent of its equipment already imported and stored in three warehouses. "We cannot throw out that which has already been invested," says Riechstul. Even so, work on the second power plant at Angra dos Reis is practically halted. Of the ambitious Brazilian Nuclear Program initiated in the 70's there remains very little, and what is left has the appearance of something saved from a fire. NUCLEBRAS today is an agency with 5,500 employees, whose main function is that of looking at each other, as was discovered by the spitefulness of the very community involved in that flirtation. The flirtation was expensive. Based on figures of the budget this year, the six companies sheltered under the NUCLEBRAS umbrella should spend 329 million cruzados on their payrolls. One of those NUCLEBRAS children, NUCLEP [NUCLEBRAS Heavy Engineering, Inc.], an industry that was to have produced one nuclear power plant per year, according to the fantasies of its creators, is idle in Itaguai, 80 kilometers from Rio, after devouring $350 million. In similar fashion, a uranium enrichment plant built in Resende, also in the state of Rio, verges on somnambulism.

Adverse File

The citizen who looks with interest at the nuclear project of the Brazilian Government circulated in the 70's has a good reason. Angra I is a typical case of something unmanageable from the viewpoint of rationality. When they bought it, those responsible for the transaction were placed in the position of a person who buys an apartment costing 1.5 million crusados for delivery in 1 year and winds up paying 9 million cruzados for the apartment with a delivery date stretched to twice the original period. That buyer moreover, would enter an apartment that would only be livable with remodeling--and it would be up to him to pay for the costs of the repairs.

To spend $1.8 billion for something of poor quality that was offered for $300 million, the military regime had to protect itself from its critics, leading it to make a careful hunt. Jose Goldemberg himself was appointed to the presidency of the National Council for Scientific and Technological Development (CNPq) by former Minister Delfim Netto in 1981, and had his appointment vetoed by the National Intelligence Service [SNI]. Another physicist, Jaime Tiommo, appointed in 1979 to the Brazilian Physics Research Center by former Minister Mario Enrique Simonsen, likewise concluded by being bombed by the SNI. In his file at the intelligence agency was an entry that had him as a communist and another that described him as anti-communist. In doubt, the SNI advised that Tiommo not be appointed, a man of moderate political ideas, who probably would place himself halfway between the two extremes that the police file placed him.

Militarized Core

A typical phenomenon of the dictatorship, that persecution of the physicists was one of the clearest monuments to the habit of centralized decisions. For a regime that believed itself omnipotent, there was nothing more natural than that of quieting those holding different opinions. If they had been called upon to give their opinions, it is possible that disasters such as that of Angra I would have been ameliorated. Something changed from that time to now. The criticis of yesterday can now occupy posts in agencies such as FUNARTE or CPNq. Essentially, however, the nuclear program maintains a militarized core, elusive and inaccessible to the adversaries of yesterday.

In the final analysis, practical and simple, we conclude by revalidating the great Simonsen Law, formulated in 1981 by former Minister Mario Henrique Simonsen. "In many cases it is better to pay the commission than to go ahead with the project," says the law. If that had been applied in the case of Angra I, no one today would have much reason to complain. Supposing a commission of 1 percent on the initial price of the power plant of $300 million; all the people with some share in the fee would have taken away a total of $3 million, enough for the construction of a very beautiful condominium on the beach of Grumari in Angra dos Reis. Thus, at least there would be something operating at the site and the country would have saved a pile of money equal to $1.8 billion enough money for rehabilitating the entire railway network that serves the metropolitan region of Rio de Janeiro.

[Box, p 107]

Westinghouse: A Bad Black Box

Westinghouse, a traditional American company, manufacturer of washing machines, telecommunications devices and electric meters, whose annual sales range around $10 billion, is considered one of the most reliable companies in the world. Over its nuclear production branch, responsible for nearly 35 percent of the total of investments of the industrial conglomerate, however, there hangs a shadow of doubt. With 71 atomic power plants scattered throughout 12 countries, Westinghouse has never recorded a real accident with the escape of radioactive steam into the environment or into the building where unprotected workers are working. A more careful examination reveals, however, that during 8 years, from 1978 to 1982, the company produced and sold plants with a genetic defect, a birthmark, which while it did not make them dangerous to handle, made them a torment for their owners. In those plants, the water used in the cooling system of the reactor is pumped with such force through the tubes that they deteriorate faster than the capabilities of the plant operators for replacing them. Westinghouse is also accused, at least once, of having been involved in a case of bribery. The government of the present president of the Philippines, Corazon Aquino, collected evidence that in 1974 Westinghouse had bribed the dictator, Ferdinand Marcos, then the Philippine president, in order to win a bid that gave it the right to install a nuclear reactor in the country. Jesus Vergara, former president of the sales branch of Westinghouse in the Philippines, also revealed during an interrogation in April this year by agents of Aquino that the American company had paid $50 million to Philippine authorities, of which $30 million had gone into the hands of Marcos. "The Westinghouse business was the cleanest transaction made by Marcos," said Vergara ironically in a statement. Westinghouse denies this story up to now.

Increase in Cost

The power plant, which according to its planning engineers would cost nearly $650 million, cost $2.2 billion, a situation that recalls the fantastic increase in cost recorded with respect to the Angra I power plant. Moreover, the plant built in the Philippines showed several defects in operation and today, 12 years after it begun, it is shut down. Specialists in nuclear energy questioned the quality of construction. There were defects in the electrical part, in the posts that held up the thousands of meters of electric cables, and in the pipes that carried radioactive water and steam. According to information obtained by the investigation opened by Corazon Aquino, Westinghouse took care of some of those problems by simply rewriting the specifications after the plant had already been built.

The questionable Westinghouse power plants were sold wholesale. Eleven of them are installed in the United States, one is in the city of Almaraz, Spain, and another in Ringhlas, Sweden. In Ringhlas, as in Almaraz, reactor defect brought serious problems. Ringhlas never managed to exceed 50 percent of its maximum planned power. Almarza reached a maximum of 60

percent, amid a number of serious difficulties, and it shut down. The Angra I power plant presents problems similar to those registered in those two power plants and in the Philippines. What is lacking to make the Brazilian and Philippino cases the same is evidence that there was bribery in Brazil.

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CSO: 5100/2038

O GLOBO VIEWS ACCORDS WITH ARGENTINA

PY122226 Rio de Janeiro O GLOBO in Portuguese 11 Dec 86 p 14

[Text] Brasilia -- The Malvinas Islands issue, disarmament, and the self-determination of Latin American countries were the subjects of speeches delivered yesterday by Presidents Jose Sarney and Raul Alfonsin during the signing ceremony of the 20 accords and the joint declaration, which was held in the West Room of the Planalto Palace.

To the warm applause of Brazilians and Argentines, President Sarney said: "The Malvinas belong to Argentina. We shall continue to render our full support so that negotiations on the issue may be undertaken and Argentina's legitimate right to the islands can be guaranteed."

Sarney said Brazil and Argentina have shown they support the peaceful use of nuclear energy through cooperation accords and joint declarations, thus dispelling any possibility of unleashing a nuclear arms race in Latin America.

President Raul Alfonsin said Latin America has left behind the unstable period of authoritarian regimes that only served to consolidate the interests of privileged minorities.

According to Alfonsin, the political integration of the two countries may result in the strengthening of Latin American countries. He added that bilateral cooperation must not seek hegemonic goals and should not become an additional burden on some countries. He added: "The political integration of our countries must yield specific benefits for each of our nations."

Here are the accords that were signed by the two presidents:

Wheat -- An agreement was signed whereby Argentina will supply Brazil with 900,000 tons of wheat between December 1986 and August 1987, beginning with a 60,000-ton shipment. The prices will be established in U.S. dollars during quarterly meetings. Payment will be made in cash, through irrevocable, nontransferable letters of credit to be negotiated exclusively through the Banco do Brasil.

Food -- The two governments agreed to review their import regulations to facilitate the exchange of garlic, rice, potatoes, onions, eggs, lettuce, chicken, beans, tomatoes, and carrots. This will help strengthen the two countries' food supplies during emergencies. The analysis of import regulations must be ready for 30 April 1987.

Annual import quotas will be applied until 1989 for the provision of rice and beans to Brazil, and bananas and cacao to Argentina. In 1987, Brazil will buy 60,000 tons of rice and 70,000 tons of beans from Argentina. Argentina has promised to buy 4,200 tons of bananas and 5,000 tons of cacao.

Binational Companies -- The decision was made to create a commission to study the laws of the two countries to outline the legal structure for the creation and operation of binational companies.

Energy and Hydrocarbons -- The two presidents voiced satisfaction with the technical cooperation accords signed by Petrobras and UPF, Government Oil Deposits, for prospecting purposes. The two presidents also announced that the joint feasibility study of the San Jeronimo-Porto Alegre gas pipeline has already mapped the course along which the pipeline will be built -- through the Parana River, Concepcion del Uruguay, Concordia, and Paso de los Libres -- and explored the two countries' gas needs, and the investment needed for the project.

Energy, Electric Power -- Presidents Alfonsin and Sarney announced the completion of the basic project for the construction of the Garabi plant, which is due to begin operating early in 1996. It was also decided that a Brazilian-Argentine consortium will be created to construct the Pichi-Picun-Leufu hydroelectric plant in southern Argentina. The construction of this plant is scheduled to begin in June 1987. In addition, the two countries decided to promote the creation of binational consortium for building hydroelectric plants in third countries.

Biotechnology -- The operational structure of the Brazilian-Argentine biotechnology center has been approved. The center, made up of research and development institutions of both countries, will undertake joint scientific-technological research and development projects.

Studies in the Economic Area -- A decision was made to create the Brazil-Argentine center for advanced studies of economy. The objectives of the center were also outlined. The center will promote systematic research on the Argentine economy by Brazilian specialists and on the Brazilian economy by Argentine economists.

Nuclear Energy -- Immediate reporting and reciprocal assistance in case of nuclear accidents and radioactive emergencies -- the Executive Directorate in charge of nuclear security and protection against radioactivity, and the Advisory Committee for the Licensing of Nuclear Facilities have been chosen as the organs that will be responsible for the immediate reporting of accidents. The reports will be sent through telex or telephone.

Nuclear Security and Protection Against Radioactivity -- Brazil and Argentina will set up a joint system for nuclear emergencies that will include exercises and the exchange of information.

Nuclear Cooperation -- The two countries will jointly develop high-density fuels for research reactors, like plutonium.

Investment Fund -- The initial capital of this organ, which was created to strengthen bilateral integration and economic cooperation, will be about $200 million or 180,831,000 special drawing rights. Each country will provide 50 percent of this capital in their respective currencies. The Investment Fund may cosponsor financial operations with Brazilian and Argentine financial institutions or with international development agencies. The fund will be managed by the Brazilian finance minister and by the Argentine economy minister.

Financial Agreement -- The Brazilian and Argentine central banks will earmark $200 million each for financing up to 15 percent of imports if the bilateral balance-of-trade deficit of either partner reaches 10 percent. This will apply only to the importation of capital goods.

Capital Goods -- Brazil and Argentina eliminated tariffs on some 300 products, establishing a single customs system. Each country will treat the selected products as if they were part of their own production. The two countries have agreed that their bilateral exchange of the listed products will reach $2 billion over the next 4 years, beginning with $300 million in 1987.

Iron and Steel -- Protocol 13, which refers to the exchange of iron and steel products between Brazilian and Argentine companies, is of a general type and provides for neither targets nor bilateral exchange agreements. It states that the appropriate officials will study the exchange in the sector and will take action to promote it. Since Argentine iron and steel plants are practically obsolete and Brazilian plants rank among the world's most sophisticated units, the exchange will tend to favor Brazilian exports, provided this country has any surplus that can be exported.

Communications -- The cooperation program in this sector will allow the Argentine Government to use the advanced Brazilian systems, including the Brasilsat satellite. The two countries will exchange information and will use state-owned and private research centers.

Promotion of Trade. -- The original protocol was signed in Buenos Aires in July. The annex to the protocol, which was signed here yesterday, states that negotiations will be held whenever the bilateral exchange of the approximately 2,000 products that were previously selected registers a surplus of more than 8 percent in favor of either partner. In the negotiations, the country that registered the surplus will grant new preferential tariffs and will include new products that it may import in the list to correct the imbalance.

The average tax on listed Brazilian products will be reduced from 28 to 19 percent. The average tax on listed Argentina products will drop to 17 percent. Since the exchange of manufactured products tends to favor Brazil because of the quality of its products, the Brazilian Government will include new Argentine raw materials when the list is revised.

Land Transportation -- The protocol establishes that merchandise transportation procedures will be simplified, particularly as they refer to tariffs, insurance, and land infrastructures. The protocol also establishes that the transportation companies of each country, including passenger carriers, will receive the same treatment.

Maritime Transportation -- The protocol provides for the creation of a working group operating under the commission in charge of the program in the sector. The working group will submit its conclusions on 30 April 1987 and will recommend measures for improving coordination for wheat and iron ore.

/9738
CSO: 5100/2052

BRIEFS

NUCLEAR ACCIDENTS PACT--Brasilia, 11 Dec (EBN)--President Jose Sarney today sent to the National Congress the text of the agreement on assistance in case of a nuclear accident or radioactive emergency, which Brazil signed in Vienna on 26 September 1986. According to Foreign Minister Abreu Sodre, the agreement on the immediate reporting of nuclear accidents "represents a significant step because it introduces a legal mechanism applicable to military nuclear facilities. The agreement also foresees the possibility of mandatory notification of any accidents with nuclear weapons or tests." [Text] [Brasilia EBN in Portuguese 2325 GMT 11 Dec 86] /9604

CSO: 5100/2054

$2 MILLION SALE OF 'ATOMIC OSCILLATORS' CANCELED

TA162004 Jerusalem Television Service in Hebrew 1925 GMT 16 Dec 86

[Excerpt] Israel has canceled a deal involving the sale of 1,000 atomic oscillators to another country. The deal referred to is worth approximately $2 million. The atomic oscillators are used in spacecraft and spy satellites, among other things. Our correspondent has learned that fear had been aroused that the atomic components would reach Soviet hands through this other country. Our correspondent Hanan 'Azran brings us the first disclosure of this affair:

[Begin recording] ['Azran] The foreign country requested to purchase these components, called oscillators [matnedim], which are used to build atomic gauges. Each such component is produced by hand, not by mass production. The oscillator is a frequency source, and because of this, is vital in the communications and electronics industry. It can withstand drastic changes in temperature and uses a minimal amount of energy. For this reason it is used in systems which require extreme precision, such as in spacecraft and spy satellites. Only four companies in the world produce atomic oscillators. One of them is this factory in Jerusalem that was established jointly with the United States.

[Company manager Ehud Orgil] In view of the fact that we have an American partner, and in light of the fact that U.S. strategic information — and it is definitely strategic — was conveyed to us, the fear exists, or the Americans have begun to fear, that this information would be leaked through us.

['Azran] The atomic oscillators are a strategic product because without them advanced electronics industry cannot be developed. In the past Israel purchased such oscillators from the United States, but recently it decided to invest in the production of frequency sources by itself. The success of this Israeli product is causing a sensation throughout the world. There is a great demand for it because of its quality and relatively low price. [passage omitted] [end recording]

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CSO: 5100/4514

REQUIREMENTS FOR NUCLEAR RESEARCH DEVELOPMENT ASSESSED

Kuwait AL-QABAS in Arabic 25 Nov 86 p 4

[Article: "Atomic and Nuclear Energy Studies by the First Kuwaiti International Authority in the Two Fields"]

[Text] Engineer 'Abd-al-Hamid 'Abd-al-Rasul Faraj submitted to the University of Kuwait a study on the introduction of an atomic program in Kuwait and the required engineers, scientists, scientific programs, and modern applications. The university, represented by deputy director of research Dr Kazim Bahbahani, said the study and accompanying proposals would be taken into consideration in future research strategies by the University of Kuwait.

Engineer 'Abd-al-Hamid 'Abd-al-Rasul Faraj, in an interview with AL-QABAS, shed some light on his study which is the first academic research of its kind undertaken by a Kuwaiti scientist in the field of atomic energy.

Engineer Faraj said his study involved two segments:

First, atomic research and applications was a preliminary study presented to the university and dealt with higher education and the development of such research because of its strategic importance in numerous fields such as power generation, water, medicine, and other vital applications in Kuwait. It would make it possible for researchers and university students to learn and train on atomic applications. Such research might need support from public and private sectors and from research centers.

He added that atomic research falls in three categories including research in nuclear sciences, the development of energy technology, and research interwoven with all aspect of life and with the development of energy and its technology. The utilization of nuclear energy will help with the economic growth which Kuwait badly needs. Therefore a foundation must be laid that consists of:

1. Creating a confident driving force that would carry responsibility between engineers and researchers.

2. Cooperating with and gaining the recognition of international research centers and the Agency for Nuclear Energy.

3. Research should be limited and concurrent in order not to spread researchers thinly over several projects.

If resources were limited, then the thrust and direction of research should be carefully selected with a view to various considerations. The internal considerations will grow along with the areas of research if it were complementary and the researchers were highly active and of high caliber. External considerations, which are legitimate, appear in the context of subsidizing such research.

Engineer Faraj said that the three external considerations are technical sciences, scientific bases, and social qualifications. He said that nuclear research has become varied and comprehensive and totally dependent on the quality of research in energy development. It also relies on research in developing the basic stage. The service ministries should therefore cooperate in this effort through organization and evaluation while taking international developments and scientific research into consideration.

He said the purpose behind nuclear energy research is economic development and social progress along with technical innovation which is the main requirement for Kuwait. Technical innovation is basically fraught with danger and such research should therefore be linked to chemical and other services and industries in the state of Kuwait. Scientists and technicians, and specially the ministry of health, should keep the commercial aspect in mind by putting radiation and radioactive isotope technology in the service of society, and especially the economic aspect.

It is therefore justified to create a nuclear energy training unit for engineers in Kuwait.

In the early days, success will be in the operation of atomic reactors in Kuwait which would produce a large number of trained technicians. The unit would own research reactors whose many distinguished graduates would teach and train the nuclear station people. The reactor would be a training center within the nuclear station and would be similar to the stations of the future.

It would be composed of the system of the reactor and its nuclear force, study of uranium and thorium, safety studies, nuclear reactor appratus, atomic and chemical radiation, and life sciences.

The first three are connected to the generation of nuclear power. The fourth is for the use of helping tools. The last is tied to nuclear technology applications.

The second aspect of the study deals with a program for nuclear energy and research in Kuwait. It deals with the creation of a general framework for research in Kuwait on energy, natural sciences, physics, minerology, applied sciences, and the physics of solids.

Engineer Faraj says that that would be the first stage. The succeeding stage would concentrate on doing atomic research after the construction of a nuclear accelerator to accelerate protons to high speeds. This also applies to (ditrons) and alpha particles.

Nuclear research depends on institutions and divisions and supporting factors within such a center. Some of these institutes and divisions would be devoted to research and others to development. I imagine that these should include an institute for nuclear and technical sciences; an institute for radiology, life sciences, and food; an institute for electronics, and computer sciences; and an institute for nuclear medicine.

The divisions would include a scientific workshop, a main library, and services and administration. Supporting sections would include a small nuclear research reactor rated at 3 megawatts, a computer to store data, a neutron generator rated at 15 milliamps, and a gamma ray generator rated at 50,000 curies.

The institute for nuclear and technical sciences would have several divisions including a division for nuclear analytical chemistry, a division for the production of radioactive isotopes, a division for the physics of nuclear hygiene, a division for the operation of nuclear reactors, and a division for the control of nuclear reactors.

Additionally, it is also necessary to create within the center a complete laboratory to keep track of modern research in various nuclear fields. It would oversee research in the various divisions separately and independently or through the creation of joint teams from the various divisions. This would give it an effective role in studying the heart of the nuclear reactor, the characteristics of the inner basin and internal sectors, the movement of neutrons in various media, the development of protective devices, the analysis of water used for cooling, the study of movement in the dynamic nuclear reactor, and the impact of force on the movement of bodies.

He added that directing a ray of neutrons at certain targets within the reactor helps with experiments on the thickness of neutron axes and deviation from the main axis. It would also be possible to obtain radioactive isotopes for disease diagnosis. It would also make it possible to do such studies as programming the burnout of nuclear fuel and radioactive materials, chemical isolation of short lived radioactive isotopes, slowing down neutrons, and ways of using tools to study the thickness of charged bodies.

This is an opportunity--in cooperation with other institutions such as the University of Kuwait, the Kuwait Institute for Scientific Research, and institutions of applied sciences--to train a complete cadre of Kuwaiti technicians, experts, and employees for work in the various fields of nuclear sciences.

12945/12859
CSO: 5100/4513

BRIEFS

CHARGES ON ILLEGAL SUPPLIES DENIED--Islamabad, 17 Nov--The Pakistan Ambassador to West Germany Mr Abdul Waheed has refuted the allegation that his embassy is secretly involved in illegally obtaining the supplies of essential requisites for Pakistan's Nuclear programme. The allegation was made in a 45-minute film screened on the German television network (ARD). In an interview with the organisers of the film, the Ambassador said Pakistan's Nuclear programme was peaceful and the embassy was not involved in smuggling or illegal activities. The Ambassador said without producing any concrete proof that the material procured in Europe was actually employed in the nuclear plants for preparing or manufacturing a nuclear device, the baseless allegation was contrary to all ethical and legal obligations prescribed by the profession (Journalism). The main idea behind the film, the Ambassador added, seemed to strengthen anti Pakistan opinion so that the supply of appropriate technology and requisite materials be denied to Pakistan. [Text] [Karachi DAWN in English 18 Nov 86 p 10] /9274

CSO: 5100/4710

SHIPS UNDERGO INSPECTION FOR RADIOACTIVE MATERIAL

Nairobi THE KENYA TIMES in English 4 Nov 86p 5

[Article by Henri Chui]

[Text] THE Kenya Radiation Protection Board makes thorough inspection of ships at the Mombasa port to make sure that radioactive material which passes through the port is properly packed.

This was said yesterday by the acting chief radiation protection officer in the Ministry of Health, Mr. S. K. Wanguru, when he led a delegation of International Atomic Energy Agency to a courtesy call on the Mombasa deputy mayor, Coun. Samuel Ndoro, at the mayor's parlour.

Wanguru said the board is forced to make the inspection to ensure that thousands of workers at the port are not exposed to radiation from uranium that passes through the port.

The International Atomic Energy Agency officials are in Mombasa to find out solution to environmental problems brought about by the disposal of solid waste, cement production, sewerage disposals and radiation through direct contact with radioactive material.

The agency officials will visit the oil refinery, the Bamburi Cement Factory and the Mombasa Municipal Council solid waste disposal areas.

Briefing the agency officials, the acting town clerk, Mr. Amos Oyalo, said solid waste disposal was one of the major problems facing the council and efforts were being made to find a lasting solution.

/13104
CSO: 3400/583

BRIEFS

NUCLEAR TECHNOLOGY REQUESTED FROM FRANCE--Michel Aurillac, France's minister for co-operation, heard a surprising request from President Didier Ratsiraka when he made his recent visit to Antananarivo, namely that France should heop Madagascar in obtaining nuclear technology, so that the country "is not left behind in 2010 or 2020." The president suggested that the first step should be the acquisition of a simple particle accelerator, and asked for the question to be put on the agenda of the next meeting of the joint Franco-Malagasy economic commission scheduled for December. Mr Aurillac obtained from the Malagasy government "undertakings for the gradual payment of indenities for the nationalisation in 1975 of French companies operating in Madagascar. Several funding agreements were signed covering scientific research and port installations. Mr Aurillac confirmed French support for the renovation of the SECREN dockyards where French tuna boats fishing in the Indian Ocean go for refitting. [Text] [Paris INDIAN OCEAN NEWSLETTER in English 25 Oct 86 p 2] /9274

CSO: 5100/18

BRIEFS

STRANDED NUCLEAR WASTE PROBE--Cape Town--Escom is investigating the cause of the problem which left the third load of nuclear waste being transported from Koeberg nuclear power station stranded on the national road at Klawer last week. An Escom spokesman said no more nuclear waste would be transported to the Vaalputs disposal facility in Namaqualand before the cause of the fault had been found and rectified. The driver of the lorry transporting the load of nuclear waste from the power station discovered a crack in the chassis of the trailer during a routine check. An Escom spokesman pointed out later that any impression created by an SABC report that the load of waste was still stranded on the road was not correct. "The waste all safely arrived at Vaalputs and there is no cause for concern," he said. [Text] [Johannesburg THE STAR in English 2 Dec 86 p 7] /9274

CSO: 5100/19

ISRAELI TECHNICIAN'S REVELATIONS ABOUT NUCLEAR FACILITY

Moscow MOSKOVSKAYA PRAVDA in Russian 11 Nov 86 p 4

[Article by M. Stoyanov: "Labeled `Secret': The Secret of Operation Hump"]

[Text] He was last seen on 30 September as he left the Mountbatten Hotel in London. Since then information about the fate of Mordechai Vanunu, a former employee of the Israeli nuclear research center at Dimona, has been the stuff of detective novels. His whereabouts have become an especially hot issue since the publication in the English SUNDAY TIMES on 5 October of an article in which Vanunu exposed secret nuclear weapons production in Israel. Today all the newspaper versions as to what might have happened to Vanunu are moot: after many days' silence, Tel Aviv has admitted that Vanunu is now in Israel, where he was taken against his will by agents of the Israeli intelligence service Mossad. Judging from information published in the English press it seems that he was kidnapped several days before the appearance of the sensational expose in the SUNDAY TIMES.

Vanunu, 31 years old, worked for 10 years at Israel's secret underground facility for the production of nuclear weapons, which is located in the Negev Desert.

Here is how the SUNDAY TIMES describes Israel's greatest secret in Vanunu's own words:

"Every day at 7:00 am," writes the newspaper, "40 blue and white Volvo buses race at high speed along a highway through the Negev Desert. At a distance of nine miles from Dimona they they turn off on a side road, halting one-half mile further along at an army checkpoint. The soldiers make a cursory pass check, and then the buses are permitted to continue on their way. Two miles later they are halted at yet another checkpoint, where security measures are more strictly observed. At that point electrified wire barriers surrounds Israel's most secret center. The sandy soil around the center has been plowed up, so that patrols will notice the tracks of possible intruders. There are observation posts atop neighboring hills. Missile batteries have orders to open fire on any aircraft which penetrates the center's airspace."

"Three times a day the Volvo buses ferry scientists, technical specialists and administrative staff to the center. Security requires that many people remain

in the dark about the duties performed at the center even by colleagues with whom they have worked together for a long time. The leaking of secrets is punishable by a 15-year prison sentence."

Disembarking from the buses, the employees disperse to their various "makhons", independent production departments. But only 150 employees have permission to enter Dimona's truly secret facility: Makhon #2.

For 30 years Israel has carefully hidden its nuclear secrets in this outwardly unremarkable concrete building. The above-ground portion of the center is what the Israelis say it is: an experimental nuclear power station. Hidden behind false walls on the first above-ground floor are freight elevators which carry people and materials down to the six underground floors. It is there that the production of nuclear weapon components and warhead parts is carried out.

The six underground floors of Makhon #2 are divided into production departments, each with its own number. There is also an auditorium where a small circle of prominent individuals -- the prime minister, the minister of defense and senior military officers -- are briefed on Operation Hump. That is the code name which Israel has given its latest atomic bomb production program.

The evidence presented by Vanunu was supported by 60 color photographs which he was able to take inside the nuclear factory. Major atomic scientists questioned by the SUNDAY TIMES have confirmed that the details reported by Vanunu are exactly correct from a scientific standpoint and are proof of something which Tel Aviv has categorically denied: Israel is developing nuclear weapons (it should be noted that the responsbility for this is borne by those Western countries, primarily the United States, which made it possible for the Israeli military to learn the secrets of military applications of the atom).

How did the SUNDAY TIMES obtain these materials?

In brief, the story is as follows: after Vanunu was fired from the nuclear center in connection with a reorganization, he emigrated to Australia. There he was tracked down by journalists, the most successful of which were from the SUNDAY TIMES, which invited him to come to London. At that point a true detective story began, all the details of which have not yet come to light.

An Australian priest named John MacKnight, who identified himself as a close friend of the Israeli, related that he first became alarmed when Vanunu stopped phoning him. "When I came to London," he said, "Mordechai called me almost daily. But as of 31 September those calls ceased. He told me that he was in fear for his life on account of his revelations concerning Israel's nuclear potential." MacKnight explained that Vanunu's decision to speak the truth was influenced by his alarm at Israel's policies. The priest did not conceal his belief that his friend was abducted by the Israeli secret service. According to him, Vanunu did not receive any money from the SUNDAY TIMES, and was guided by "honorable motives" alone.

MacKnight attempted to find out about his friend's fate from the chancellery of Israel's prime minister. But in response to all his calls he was told that they "knew nothing about the matter."

Now it is obvious that that was a blatant lie.

The press has attempted to romanticize this story. The American magazine NEWSWEEK, for example, reported his abduction as having occurred on a yacht in the Mediterranean, to which Vanunu was allegedly lured by a "beautiful lady." It was hinted that he was a Mossad agent himself and that his expose had been staged for the purpose of intimidating the Arab world with the knowledge that Israel already possesses atomic bombs.

However, it turns out that everything was both simpler and more scandalous. Vanunu, who had dared to speak the truth, was abducted in broad daylight in London with the blessing of the English authorities. Thus, the DAILY TELEGRAPH, quoting informed circles close to the Israeli Government, has pointed out that Shimon Peres, Israel's former prime minister, on 21 September personally informed Margaret Thatcher by telephone of the operation to kidnap Vanunu which was in the offing. According to information from those circles, the newspaper emphasized, the head of the British Government agreed to order British intelligence to "close its eyes to the Israeli action." The OBSERVER notes that Margaret Thatcher was informed of Tel Aviv's intention to "return" Vanunu as much as two weeks prior to the publication in the English press of the documentary evidence which he had provided concerning the production of nuclear weapons in Israel.

The position taken by the conservative government on the Vanunu abduction once again bears witness to the fact that the present Tory cabinet has a very strange concept of standards of international law. At the same time as Syria was being threatened with thunder and lightning from the banks of the Thames and accused without proof of sponsoring terrorism, official London gave a "green light" to secret kidnappings of people who warn of the danger presented by a state whose policies are founded on overt terror.

Thus, Vanunu was arrested after being abducted by Mossad agents. It is reported that he is currently under investigation. But that is by no means the final word in this story, which revealed the secret Operation Hump: an operation to produce nuclear weapons in the Negev Desert.

12825
CSO: 5100/011

IAEA SAFETY DIRECTOR ON NUCLEAR ACCIDENT REPORTING

AU071801 Paris AFP in English 1748 GMT 7 Nov 86

[Text] Vienna, Nov 7 (AFP) — Nuclear safety experts meeting here this week have said an incident reporting system within the International Atomic Energy Agency (IAEA) is not working as well as it should.

Morris Rosen, the agency's director of nuclear safety, said effectiveness has been limited by the fact that not all the 26 countries possessing functioning nuclear reactors adhere to the incident notification mechanism. Mr. Rosen, who did not identify those countries that do not participate, added that reports supplied the agency are "not at the same standard level."

His remarks came at the close of a five-day gathering here of 173 experts from 48 countries. The meeting had been called in response to the accident last April 26 at the nuclear power plant at Chernobyl in the Soviet Union.

Reports of incidents submitted to the agency are studied in depth by experts seeking to identify problems common to all nuclear reactors.

Since the notification system was first established in 1982, the agency has received 250 reports, of which 180 came from Western industrial nations in the Organization for Economic Cooperation and Development (OECD).

Mr. Rosen said the Vienna-based agency wanted to receive around 200 reports a year covering the estimated 400 reactors now in existence.

The experts also said the agency should publish two additional guides for nuclear plant users, one on fire prevention and another on trial procedures.

Recommendations will be presented to the IAEA's governing council at a meeting December 8.

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CSO: 5100/2411

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